

QST

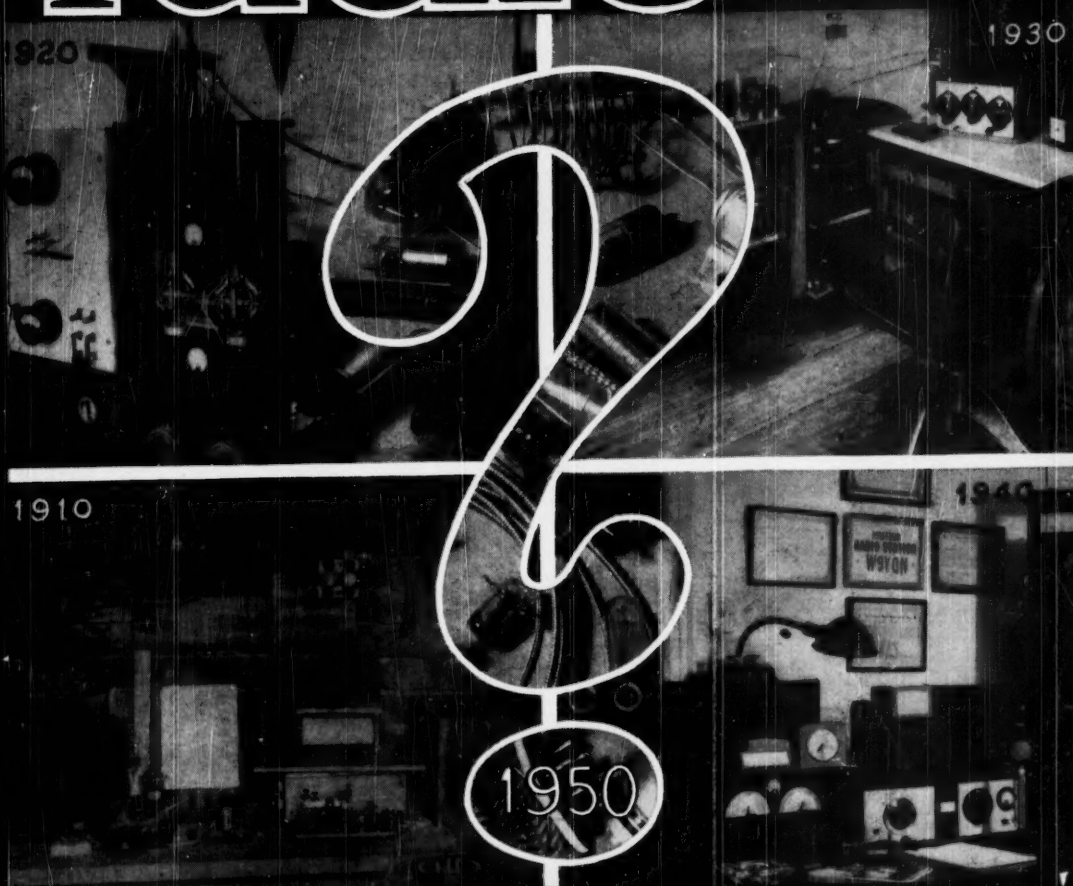
JANUARY, 1950

40 Cents

45c in Canada

devoted entirely to

amateur radio

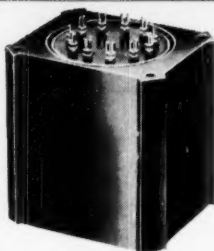


PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

Linear Standard Units...

THE ULTIMATE IN QUALITY...

UTC Linear Standard Audio Transformers represent the closest approach to the ideal component from the standpoint of uniform frequency response, low wave form distortion, high efficiency, thorough shielding and utmost dependability. UTC Linear Standard Units offer these features:



- **True Hum Balancing Coil Structure** . . . maximum neutralization of stray fields.
- **Balanced Variable Impedance Line** . . . permits highest fidelity on every tap of a universal unit . . . no line reflections or transverse coupling.
- **Reversible Mounting** . . . permits above chassis or sub-chassis wiring.
- **Alloy Shields** . . . maximum shielding from inductive pickup.
- **Hiperm-Alloy** . . . a stable, high permeability nickel-iron core material.
- **Semi-Toroidal Multiple Coil Structure** . . . minimum distributed capacity and leakage reactance.
- **Precision Winding** . . . accuracy of winding .1%, perfect balance of inductance and capacity; exact impedance reflection.
- **High Fidelity** . . . UTC Linear Standard Transformers are the only audio units with a guaranteed uniform response of ± 1 DB from 20-20,000 cycles.

TYPICAL LS LOW LEVEL TRANSFORMERS

Type No.	Application	Primary Impedance	Secondary Impedance	± 1 db from	Max. Level	Relative hum-pickup reduction	Max. Unbalanced DC in prim'y	List Price
LS-10	Low impedance mike, pickup, or multiple line to grid	50, 125, 200, 250, 333, 500/600 ohms	60,000 ohms in two sections	20-20,000	+15 DB	-74 DB	5 MA	\$25.00
LS-10X	As Above	As above	50,000 ohms	20-20,000	+14 DB	-92 DB	5 MA	32.00
LS-12	Low impedance mike, pickup, or multiple line to push pull grids	50, 125, 200, 250, 333, 500/600 ohms	120,000 ohms overall, in two sections	20-20,000	+15 DB	-74 DB	5 MA	28.00
LS-12X	As above	As above	80,000 ohms overall, in two sections	20-20,000	+14 DB	-92 DB	5 MA	35.00
LS-26	Bridging line to single or push pull grids	5,000 ohms	60,000 ohms in two sections	15-20,000	+20 DB	-74 DB	0 MA	25.00
LS-19	Single plate to push pull grids like 2A3, 6L6, 300A. Split secondary	15,000 ohms	95,000 ohms; 1.25:1 each side	20-20,000	+17 DB	-50 DB	0 MA	24.00
LS-21	Single plate to push pull grids. Split primary and secondary	15,000 ohms	135,000 ohms; turn ratio 3:1 overall	20-20,000	+14 DB	-74 DB	0 MA	24.00
LS-22	Push pull plates to push pull grids. Split primary and secondary	30,000 ohms plate to plate	80,000 ohms; turn ratio 1.6:1 overall	20-20,000	+26 DB	-50 DB	.25 MA	31.00
LS-30	Mixing, low impedance mike, pickup, or multiple line to multiple line	50, 125, 200, 250, 333, 500/600 ohms	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+17 DB	-74 DB	5 MA	25.00
LS-30X	As above	As above	As above	20-20,000	+15 DB	-92 DB	3 MA	32.00
LS-27	Single plate to multiple line	15,000 ohms	50, 125, 200, 250, 333, 500/600 ohms cycles	30-12,000	+20 DB	-74 DB	8 MA	24.00
LS-50	Single plate to multiple line	15,000 ohms	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+17 DB	-74 DB	0 MA	24.00
LS-51	Push pull low level plates to multiple line	30,000 ohms plate to plate	50, 125, 200, 250, 333, 500/600 ohms	20-20,000	+20 DB	-74 DB	1 MA	24.00
LS-141	Three sets of balanced windings for hybrid service, center-tapped	500/600 ohms	500/600 ohms	30-12,000	+10 DB	-74 DB	0 MA	28.00

Write for our Catalog PS-408

150 VARICK STREET

NEW YORK 13, N. Y.

EXPORT DIVISION: 13 EAST 40th STREET, NEW YORK 16, N. Y. CARLES ARLEN



**Four GL-811-A's, putting out 620 w
(zero-bias), cost but slightly more
than one 50-watter!**

GL-811-A POWER TRIODE

Filament voltage	6.3 v
Filament current	4 amp
Amplification factor	160

Typical operating conditions (ICAS).

Class B a-f power amplifier and modulator:

	2 tubes	4 tubes
d-c plate voltage	1,250 v	1,250 v
d-c grid voltage	0 v	0 v
max signal driving power (approx)	6.0 w	12.0 w
max signal power output (approx)	310 w	620 w

DECIDEDLY a "best buy", the new GL-811-A! Whether you're running high power or low, the cost advantage is substantial. Two tubes will give you enough audio (340 w max) for a moderate-power transmitter, and should you own—or whenever you complete—that dream kilowatt rig, a second pair in p-p parallel will double your modulator output.

As a smart ham, wise in the ways of circuits, you may wish to reap the benefits of zero-bias operation. They're important benefits. First, modulator distortion is all but eliminated. Second, no C batteries or voltage-regulated bias pack are needed . . . chalk up another economy! Zero-bias, you won't get *quite* so high an audio output (310 w for two tubes instead of 340 w), but the small loss is outweighed by the advantages.

Adding two more GL-811-A's to your original pair—if you climb from moderate to high power—calls for no tube replacements, consequently no wastage. And you then will have a modulator powerful enough for any legal rig. A further protection to your investment is the up-to-the-minute design of the GL-811-A: its new and stronger construction, superior high-voltage insulation, improved plate structure with radiating fins.

See this fine new tube today—learn its low price—from your G-E tube distributor! Or write *Electronics Department, General Electric Company, Schenectady 5, New York*.

Series 7 in a listing, by areas, of tube distributors who can supply you with Ham News, G.E.'s bi-monthly magazine:

Ann Arbor, Mich.: Wedemeyer Electric Supply Co.
Champaign, Ill.: Radio Doctors.
Chicago, Ill.: Allard Radio Corp.; J. G. Bowman and Co.; Concord Radio; R. Cooper Jr., Inc.; Green Mill Radio Supply; Lukko Sales Corp.; Newark Electric Co.
Des Moines, Ia.: Radio Trade Supply.
Detroit, Mich.: M. N. Duffy Co.; General Electric Supply Corp.; Radio Electronic Supply; Radio Specialties Co.; Radio Supply and Engineering.
Duluth, Minn.: Northwest Radio Co.
Flint, Mich.: Lifsey Distributing Co.
Grand Rapids, Mich.: Radio Electronic Supply.
Jackson, Mich.: Fulton Radio Supply.
Jacksonville, Ill.: Baptist Radio Laboratories.
LaCrosse, Wis.: General Electric Supply Corp.
Lansing, Mich.: Wedemeyer Electric Supply Co.
Madison, Wis.: Satterfield Radio Supply.
Manitowoc, Wis.: Harris Radio Corp.
Mason City, Ia.: Crescent Electric Supply Co.
Milwaukee, Wis.: Radio Parts Co., Inc.
Minneapolis, Minn.: Northwest Radio and Electric Supply.
Muskegon, Mich.: Fitzpatrick Electric Supply Co.
Oak Park, Ill.: Melvin Electronics Co.
Ottumwa, Ia.: Radio Trade Supply Co.
Peoria, Ill.: R. Cooper Jr., Inc.; Klaus Radio and Electric Supply.
Pontiac, Mich.: Electronic Supply Co.
Rock Island, Ill.: Tri-City Radio Supply Co.
Rockford, Ill.: General Electric Supply Corp.
St. Paul, Minn.: Hall Electric Co.
Sioux City, Ia.: Crescent Electric Co.
Springfield, Ill.: Mr. Harold Bruce.

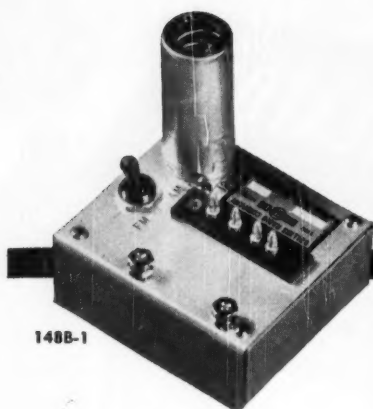
(List as of October 25, 1949)

ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR

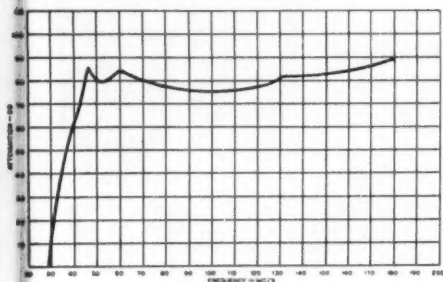
GENERAL  ELECTRIC

180 JAT

More dope on 32V accessories



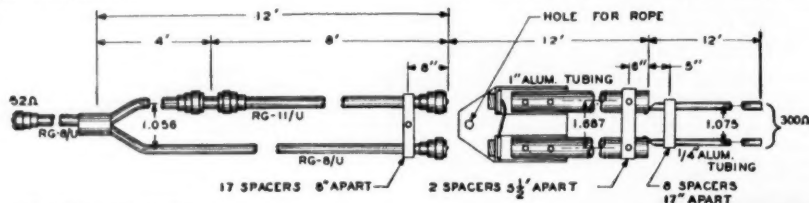
148B-1



148B-1 NB FM Adapter—The new Collins 148B-1 Narrow Band FM Adapter (shown at top) is for use with either the 32V-1 or the 32V-2 transmitter. It plugs into the 70E-8 variable frequency oscillator, and is suitable for FM operation on all bands. Frequency deviation is adjusted by the audio gain control on the transmitter. A toggle switch selects AM or FM. Available soon at your Collins dealer's. The price is \$31.75.

35C-1 Low Pass Filter—A coaxial fitting at the rear of the 32V-2 cabinet permits the use of an RG58/U or RG8/U transmission line in which the new Collins 35C-1 Low Pass Filter may be inserted. The 35C-1 is a 52 ohm three-section filter which, with approximately 0.2 db insertion loss below 29.7 mc, provides more than 75 db of attenuation to harmonics in the television range as shown in the curve at left. This high attenuation is added to that provided in the 32V-2 transmitter. The unbalanced output permits grounding of the outer conductor of the line and the case of the filter. The price of the 35C-1 Filter is \$40.

315E Balun Transformer—For best operation, the 35C-1 Filter should feed a properly terminated 52 ohm line. Coupling to a balanced antenna may be accomplished by an antenna tuner or by the new Collins 315E-1 Balun Transformer, which is a wide band, low loss transmission line (diagram below) for coupling from a 52 ohm unbalanced line to a 300 ohm balanced load without tuning controls. It consists of a transmission line connected to transfer from unbalanced to balanced conditions ("balun") and a step-tapered impedance matching line. Over the frequency range 7 to 30 mc, a standing wave ratio of less than 2 to 1 is possible. The efficiency of the system is good even beyond the specified limits. The 315E-1 is supplied in kit form with coaxial cables completely made up, and aluminum tubing and spacers fabricated ready to assemble. Available soon at your Collins dealer's. The price is \$62.



315E Balun schematic

FOR SUCCESS IN AMATEUR RADIO, IT'S ...

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 W. 42nd St.
NEW YORK 18

2700 West Olive Ave.
BURBANK

M & W Tower
DALLAS 1

Fountain City Bank Bldg.
KNOXVILLE



PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., AT WEST HARTFORD, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

STAFF

Editorial
A. L. BUDLONG, W1BUD
Editor

HAROLD M. McKEAN, W1CEG
Managing Editor

GEORGE GRAMMER, W1DF
Technical Editor

DONALD H. MIX, W1TS
BYRON GOODMAN, W1DX
Assistant Technical Editors

EDWARD P. TILTON, W1HDQ
V.H.F. Editor

RICHARD M. SMITH, W1FTX
C. VERNON CHAMBERS, W1JEC
Technical Assistants

ROD NEWKIRK, W9BRD
DX Editor

WALTER E. BRADLEY, W1FWH
Technical Information Service

Production
RALPH T. BEAUDIN, W1BAW
Production Manager

NANCY A. PRICE
Assistant

Advertising
F. CHEYNEY BEEKLEY, W1GS
LORENTZ A. MORROW, W1VG
EDGAR D. COLLINS

Circulation
DAVID H. HOUGHTON
Circulation Manager

RALPH T. BEAUDIN, W1BAW
Assistant Circulation Manager

OFFICES

38 La Salle Road
West Hartford 7, Connecticut

Subscription rate in United States and Possessions, \$4.00 per year, postpaid; \$4.50 in the Dominion of Canada, \$5.00 in all other countries. Single copies, 40 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 9, 1922. Additional entry at Concord, N. H., authorized February 21, 1929, under the Act of February 28, 1925.

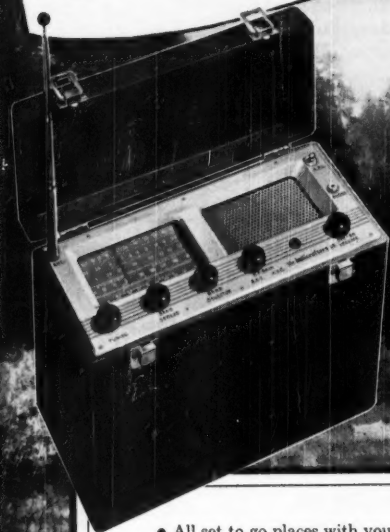
Copyright 1950 by the American Radio Relay League, Inc. Title registered at U. S. Patent Office.

INDEXED BY
INDUSTRIAL ARTS INDEX

— CONTENTS —

"It Seems to Us . . ."	9
Our Cover	10
A High-Attenuation Filter for Harmonic Suppression A. M. Pichitino, W3NJE	11
Antenna Polarization on 144 Mc. Edward P. Tilton, W1HDQ	13
16th ARRL International DX Competition	17
A One-Tube VFO Amplifier Gerald T. White, W3LTR, and L. W. Sieck, W4KMG	20
Feed-Back	21
Folded Elements in a Reversible Unidirectional Array Bruce Kelley, W2JCE/W2QCP	22
10-Meter WAS Contest	25
In QST 25 Years Ago This Month	25
Chicagoland Ham Mobilers Serve as Communications First-Liners	26
Happenings of the Month	28
An RC-Type Audio Signal Generator Richard M. Smith, W1FTX	32
On the Air with Single Sideband	38
How's DX?	39
Audio Phase-Shift Networks . George H. Nibbe, W6BES	42
Hints and Kinks	46
United States Naval Reserve	47
Debugging the Electronic Bug Richard H. Turrin, W2IMU	48
Answering the Beginner's Question — "C.W. or 'Phone?" Dallas T. Hurd, W2PFU	50
3rd V.H.F. Sweepstakes, Jan. 21st-22nd F. E. Handy, W1BDI	52
Silent Keys	53
Surplus Corner — Plug-In Exciters from "Command" Transmitters	54
The World Above 50 Mc.	56
ARRL QSL Bureau	60
Military Amateur Radio System	60
Correspondence from Members	61
Operating News	62
Station Activities	70

New
hallicrafters
 Portable
 communications
 receiver . . .
 MODEL S-72
\$79.95



• All set to go places with you — anywhere! Extra sensitivity for weak signal areas . . . extra performance for good Ham operation.

The newest thing in portables, just introduced by Hallicrafters. One r-f, two i-f stages. Range 540

kc to 31 Mc in 4 Bands. 8 tubes plus rectifier. AC, DC, or batteries.

Long-Wave Version—S-72L, covers airways range and control towers frequency, omitting highest short-wave band. \$89.95.

the hallicrafters co.

4401 W. Fifth Ave. • Chicago 24, Ill.

Manufacturers of Precision Radio and Television Equipment



Standard of Excellence

PRs are on top! Wherever you go, the world around . . . wherever dependable radio frequency control is essential . . . PR Crystals stand out as the standard by which other crystals are judged. This is no accident. PR stands for superb **QUALITY**. Nothing is spared to make PRs truly the standard of excellence . . . and your dealer will tell you the same thing.

10 METERS, Type Z-5, \$5.00 • 20 METERS, Type Z-3, \$3.75 • 40, 80 & 160 METERS, Type Z-2, \$2.75

Crystals

Since 1934

USE AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
2800 W. BROADWAY • COUNCIL BLUFFS, IOWA

Section Communications Managers of the ARRL Communications Department

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in QST. **All ARRL Field Organization appointments** are now available to League members. These include ORS, OEE, OPS, OO and OBS. Also, where vacancies exist SCMs desire applications for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, *all amateurs* are invited to join the ARRL Emergency Corps (ask for Form 7).

ATLANTIC DIVISION				
Eastern Pennsylvania	W3BES	Jerry Mathis	623 Crescent Ave.	Glenside Gardens
Maryland-Delaware-D.C.	W3BVT	Enna W. Darne	132 Tennessee Ave., N.E.	Washington 2, D. C.
Southern New Jersey	W2ASG	Dr. Luther M. Mkitarian	500 Warwick Road	Haddonfield
Western New York	W2PGT	Harding A. Clark	RFD 2	Manlius
Western Pennsylvania	W3KWL	Ernest J. Hlinsky	509 Beechwood Ave.	Farrell
CENTRAL DIVISION				
Illinois	W9EVJ	Lloyd E. Hopkins	27 Lynch St.	Elgin
Indiana*	W9RE	W. E. Monigan	1504 East Ewing	South Bend 14
Wisconsin	W9RQM	Reno W. Goetach	929 S. 7th Ave.	Wausau
DAKOTA DIVISION				
North Dakota	W0GZD	Paul M. Bossoletti	204 Polk St.	Grand Forks
South Dakota	W9NGM	J. S. Fosberg	509 Idaho Ave., S.E.	Huron
Minnesota	W0RA	John B. Morgan	1411 Summit Ave.	St. Paul 5
DELTA DIVISION				
Arkansas	W5JIC	Marshall Riggs		Danville
Louisiana	W5VT	W. J. Wilkinson, jr.	Room 313, Jefferson Hotel	Shreveport
Mississippi	W5DLA	J. C. Wallis	2406 Kelly St.	Culport
Tennessee	W4QT	Ward Buhrman	1000 Overlook Ave.	Chattanooga
GREAT LAKES DIVISION				
Kentucky	W4CDA	W. C. Alcock	155 St. Mildred's Court	Danville
Michigan	W8AQA	Robert B. Cooper	132 Guild St., N.E.	Grand Rapids
Ohio	W8WZ	Dr. Harold E. Stricker	247 W. 5th St.	Marysville
HUDSON DIVISION				
Eastern New York	W2EOD	Fred Skinner	500 Wolfs Lane	Pelham 65
N. Y. C. & Long Island	W2OBU	George V. Cooke	88-31 239th St.	Bellerose 6, L. I.
Northern New Jersey	W2ANW	Thomas J. Lydon	190 Mortimer	Rutherford
MIDWEST DIVISION				
Iowa	W0PPP	William G. Davis	3rd St.	Mitchellville
Kansas	W0ICV	Earl N. Johnston	624 Roosevelt	Topeka
Missouri	W0ICD	Ben H. Wendt	RFD 8	North Kansas City
Nebraska	W0OED	Scott E. Davison	433 North Nye Ave.	Fremont
NEW ENGLAND DIVISION				
Connecticut	W1VB	Walter L. Glover	Glover Ave.	Newtown
Maine	W1VV	Manley W. Haskell	15 Hemlock St.	Portland
Eastern Massachusetts	W1ALP	Frank L. Baker, jr.	91 Atlantic St.	North Quincy 71
Western Massachusetts	W1AZW	Prentiss M. Bailey	62 Dexter St.	Pittsfield
New Hampshire*	W1CWR	Clifton R. Wilkinson		Salem Depot
Rhode Island	W1CJH	Roy B. Fuller	17 Ledge Road	East Greenwich
Vermont	W1NLO	Burtis W. Dean	P. O. Box 81	Burlington
NORTHWESTERN DIVISION				
Alaska	KL7IG	Charles M. Gray	Box 1247	Douglas
Idaho	W7IWU	Alan K. Ross	2105 Irene St.	Boise
Montana	W7EGN	Fred B. Tintinger	328 Central	Whitefish
Oregon	W7MQ	J. E. Roden	319 N.W. Ninth	Pendleton
Washington	W7ACF	Clifford Cavanaugh	Route 1	Auburn
PACIFIC DIVISION				
Hawaii	KH6HJ	Dr. Robert Katauki	1817 Wilhelmina Rise	Honolulu 17
Nevada	W7CX	N. Arthur Sowle	Box 2025	Reno
Santa Clara Valley	W6BFT	Roy E. Pinkham	1061 Fremont St.	Santa Clara
East Bay	W6TI	Horace R. Greer	414 Fairmount Ave.	Oakland 11
San Francisco	W6LN	Samuel C. Van Liew	215 Knowles Ave.	Daly City
Sacramento Valley	W6ZF	Ronald G. Martin	2638 13th St.	Sacramento 14
San Joaquin Valley	W6FKL	Ted R. Souza	3515 Home Ave.	Fresno 4
ROANOKE DIVISION				
North Carolina	W4CYB	W. J. Wortman	c/o Duke Power Co.	Charlotte 1
South Carolina	W4AZT	Wade H. Holland	P. O. Box 116	Greenville
Virginia	W4KFC	Victor C. Clark	Box 73	Annandale
West Virginia	W8JM	Donald B. Morris	303 Home St.	Fairmont
ROCKY MOUNTAIN DIVISION				
Colorado	W0IQZ	M. W. Mitchell	(Election in progress)	Denver 7
Utah	W7KFB	Marion R. Neary	Box 215	Laramie
Wyoming	W7KFB			
SOUTHEASTERN DIVISION				
Alabama	W4YE	Leland W. Smith	615 Southmont Drive	Montgomery
Florida	W4FWZ	John W. Hollister	3800 Springfield Blvd.	Jacksonville
Western Florida	W4ACB	S. M. Douglas, jr.	P. O. Box 3	Tallahassee
Georgia	W4DXI	Clay Griffin	1557 Athens Ave., S.W.	Atlanta
West Indies (Cuba-P.R.-V.I.)	KP4KD	Everett Mayer	P. O. Box 1061	San Juan 5, P. R.
Canal Zone	KZSAW	Everett R. Kimmel	Box 264	Gamboa, C. Z.
SOUTHWESTERN DIVISION				
Los Angeles	W6IOX	Vincent J. Haggerty	1017 Indio Muerto St.	Santa Barbara
Arizona	W7MLL	Gladde C. Elliott	39 North Melwood	Tucson
San Diego	W6BWO	Dale S. Bose	12851 E. California St.	Santa Ana
WEST GULF DIVISION				
Northern Texas	W5CDU	Joe G. Buch	5234 Vickery Boulevard	Dallas
Oklahoma	W5AHT/AST	Frank E. Fisher	104 East 11th St.	Pawhuska
Southern Texas	W5BDI	Ammon O. Young	4803 Eli St.	Houston 7
New Mexico	W5SMA	Lawrence R. Walsh	P. O. Box 1663	Los Alamos
MARITIME DIVISION				
Maritime (Nfld. & Labr. att.)	VE1DQ	A. M. Crowell	69 Dublin St.	Halifax, N. S.
ONTARIO DIVISION				
Ontario	VE3CP	Thomas Hunter, jr.	1920 Ellrose Ave.	Windsor, Ont.
QUEBEC DIVISION				
Quebec	VE2GL	Gordon A. Lynn	R.R. No. 1	Ste. Genevieve de Pierrefonds, P. Q.
VALLEY DIVISION				
Alberta	VE6MJ	Sydney T. Jones	P. O. Box 373	Edmonton, Alta.
British Columbia	VE7FB	Ernest Savage	4553 West 12th Ave.	Vancouver
Yukon	VE8AK	W. R. Williamson	P. O. Box 534	Whitehorse, Y. T.
PRAIRIE DIVISION				
Manitoba	VE4AM	A. W. Morley	26 Lennox Ave.	St. Vital
Saskatchewan	VE5DW	J. H. Goodridge	c/o Canadian Pacific Air Lines	Regina

* Officials appointed to act temporarily in the absence of a regular official.

...from the HAMS at
hallicrafters
to HAMS everywhere...

**comes this new
type of receiver the
HAM WORLD has been waiting for!**

SX-71
\$179⁵⁰



First announced last summer, then checked and rechecked with the same painstaking accuracy that a Ham would use on his own gear, this outstanding new receiver is at last ready for production.

It's a double superhet, with $2\frac{1}{2}$ kc "nose" selectivity and built-in NBFM reception among its extra features. One r-f, two conversion, and 3 i-f stages provide plenty of sensitivity. Of course, it's temperature compensated and voltage regulated. And the clean-cut station separation is a dream of operating enjoyment.

It isn't a set designed to win praise from music lovers who insist on high fidelity audio. But if you are the Ham who wants *performance above all else*, here is the set for you.

Naturally, there's no use claiming that this 11-tube (plus rectifier and regulator) set is

the best on the market. For several tubes and a couple of hundred dollars more, we could (and probably will sometime in 1950) build a better Ham set. But of this we are sure—now or in the future—that, considering both performance and price, the SX-71 will be in a class by itself.

During the current month, new SX-71's are starting to appear at Hallicrafters' distributors throughout the country. We'd suggest you watch for them—and examine one for yourself. Meanwhile, if you want the latest dope, write to us direct and we will be glad to send you a new "spec" sheet.

**See it at your
hallicrafters'
dealer**

the hallicrafters co.

4401 WEST FIFTH AVENUE • CHICAGO 24, ILLINOIS

THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the Secretary at the administrative headquarters at West Hartford, Connecticut.



Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914-1936
EUGENE C. WOODRUFF, W8CMP, 1936-1940

Officers

President GEORGE W. BAILEY, W2KH
New York, N. Y.
Vice-President J. LINCOLN MCCARGAR, W6EY
Oakland, California
Secretary A. L. BUDLONG, W1BUD
West Hartford, Connecticut
Communications Manager FRANCIS E. HANDY, W1BDI
West Hartford, Connecticut
Treasurer DAVID H. HOUGHTON
West Hartford, Connecticut

General Counsel PAUL M. SEGAL
816 Connecticut Ave., Washington 6, D. C.

Assistant Secretaries JOHN HUNTOON, W1LVQ
RICHARD L. BALDWIN, W1IKE
West Hartford, Connecticut

DIRECTORS

President

GEORGE W. BAILEY, W2KH
1 East 79th St., New York 21, N. Y.

Vice-President

J. LINCOLN MCCARGAR, W6EY
66 Hamilton Place, Oakland 12, Calif.

Canadian General Manager

ALEX REID, VE2BE
240 Logan Ave., St. Lambert, P. Q.
Alternate: William W. Butchart, VE6LQ
10740 107 St., Edmonton, Alta.

Atlantic Division

WALTER BRADLEY MARTIN, W3QV
1033 Arbuta Rd., Abington, Pa.
Alternate: Henry W. Wickenhiser, Jr., W3KWA
1112 State Ave., Coraopolis, Pa.

Central Division

JOHN G. DOYLE, W9GPI
4331 N. Wildwood Ave., Milwaukee 11, Wis.
Alternate: Wesley E. Marriner, W8AND
624 College Ave., Dixon, Ill.

Dakota Division

GOODWIN L. DOSTAND, W8TSN
Moorhead, Minn.
Alternate: Robert A. Kimber, W0BLK
Canyon Lake Rd., Rapid City, S. D.

Delta Division

VICTOR CANFIELD, W5BSR
P. O. Box 985, Lake Charles, La.
Alternate: George S. Acton, W5BMM
Plain Dealing, La.

Great Lakes Division

JOHN H. BRAHR, W8SPF
417 Ford Bldg., Detroit 26, Mich.
Alternate: Harold E. Stricker, W8WZ
247 W. 5th St., Marysville, Ohio

Hudson Division

JOSEPH M. JOHNSTON, W2SOX
423 Monmouth Ave., Bradley Beach, N. J.
Alternate: Gay E. Millus, Jr., W2NJE
170 Broadway, New York 7, N. Y.

Midwest Division

LEONARD COLLETT, W0DEA
Civil Aeronautics Administration
Box 776, Joplin, Mo.
Alternate: Alvin G. Keyes, W0KTQ
1201 Merchants Nat'l Bank Bldg., Cedar Rapids, Ia.

New England Division

PERCY C. NOBLE, W1BVR
37 Broad St., Westfield, Mass.
Alternate: Clayton C. Gordon, W1HRC
70 Columbia Ave., Providence 5, R. I.

Northwestern Division

R. REX ROBERTS, W7CPY
110 W. Brennan St., Glendive, Mont.
Alternate: Allan D. Gunston, W7GP
7209 Wright Ave., Seattle 6, Wash.

Pacific Division

KENNETH E. HUGHES, W6CIS
810 W. Orange Ave., So. San Francisco, Calif.
Alternate: C. Porter Evans, W6BF
134 Dracena Ave., Piedmont 11, Calif.

Roanoke Division

J. FRANK KEY, W4ZA
Box 707, Buena Vista, Va.
Alternate:

Rocky Mountain Division

FRANKLIN K. MATEJKA, W0DD
P. O. Box 212, Estes Park, Colo.
Alternate: William R. White, W0PDA
1263 Pearl St., Denver 3, Colo.

Southeastern Division

LAMAR HILL, W4BOL
104 Myrtle, Cochran, Ga.
Alternate: William P. Slides, W4AUP
Fleming Road, Montgomery, Ala.

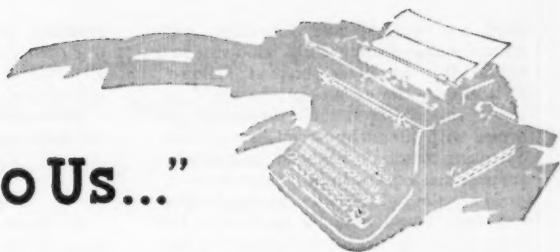
Southwestern Division

JOHN R. GRIGGS, W6KW
3212 Grape St., San Diego 2, Calif.
Alternate: John E. Blekel, W6NY
14820 E. Whittier Blvd., Whittier, Calif.

West Gulf Division

WAYLAND M. GROVES, W5NW
P. O. Box 586, Odessa, Texas
(W5NW at Humble Pipe Line Camp, Odessa)
Alternate: David H. Calk, W5BHO
7730 Joplin St., Houston 17, Texas

"It Seems to Us..."



WHERE'S THAT 21-MC. BAND?

We've just returned from a trip, principally to affiliated clubs and conventions on the West Coast, speaking on current amateur affairs. Naturally enough, the FCC proposals came in for first attention. Next in line, however, judging from the questions we got, was the 21-Mc. band — when do we get it? Some of the gang who asked about it had seen our editorial on the subject just a year ago and wanted to be brought up to date; others hadn't seen it and simply wanted to get the whole story on what was holding up what many fellows regard as among the most desirable DX frequencies we will have. In practically all cases, it turned out to be advisable to go back and give pretty much the entire background on this matter. All of this leads us to believe we might well tell the story in *QST* again, and since that was accomplished about as concisely as we know how in the treatment a year ago, we will simply reprint portions of that editorial and then continue on to bring the situation up to date.

One of the first things we discovered in our talks is that most fellows thought the Atlantic City regulations and allocation table are now in effect. Well, they are and they aren't. It is true that the main body of the regulations did become effective January 1, 1949; so did the allocations table *above 27.5 Mc.* But not the allocation table *below 27.5 Mc.* — that is still just as it was prior to Atlantic City.

Why? Let's go back to that other editorial:

The answer to that is the extensive nature of the changes being made in allocations in the region below 27.5 Mc. We amateurs may not think Atlantic City changed the allocation table very much; it's another story for the other services! Virtually wholesale changes are in the works for them, to an extent that amateurs unfamiliar with the details of the allocation table can scarcely appreciate. These complications arise from the inevitable increase of space for h.f. broadcasting — because the majority of the nations wanted it — and the necessity for carving out of

the spectrum sufficient operating frequencies for what is almost a brand-new service, from the standpoint of the international allocations table: aviation. Between the two of them, they made it necessary to find hundreds of kilocycles in the spectrum between 2 and 27.5 Mc. Those channels had to come out of a spectrum in which there are no unassigned frequencies.

Well, they came. But what it means to the radio world is the biggest readjustment for other services that the radio world has faced since the Washington conference of 1927 first created assignments on the high frequencies. Entire bands of frequencies heretofore assigned to the maritime-mobile service have disappeared; not only must the ship stations operating there shift to new frequencies, but the shore stations with which the ships communicated must also shift. Fixed circuits established in bands now to be assigned to aviation or broadcasting (or now in the 21-Mc. amateur band) must move. Move, yes — but where? The Berne list of frequency registrations has stations assigned on every available channel from top to bottom; more than that, there is usually more than one assignment for the same channel, and any subsequent registrations after the "first" must accept a lower priority, operating only if no interference is caused to the earlier registrant or registrants. Some of the circuits that must be shifted, however, are in themselves "priority" circuits, whose operation is vital; somehow a way must be found to continue them in spite of the fact they have no chance of assuring themselves of continuing rights if they move in on presently-registered assignments.

The radio world, confronted with this apparently insurmountable problem, took the plunge — it decided to wash out all the old system of registrations under the Berne procedure, to throw the whole thing overboard bag and baggage, and to make a completely new start on an "engineered" allocation of every single one of the existing

fixed and coastal and broadcast and ground stations in the world. They decided to do this by assembling at Geneva, Switzerland, the experts of the world on these circuits and their requirements, armed with circuit-by-circuit lists of their operating requirements and assisted by propagation experts to help them engineer precisely the right frequencies required — but only those actually required — for their operation. They would employ to the fullest extent, as indeed they are forced to, such technical expedients as geographical and time sharing of frequencies, low-power relays to permit more operation simultaneously on the same frequency in widely-separated regions, and such operating expedients as multiplexing, forked circuits, etc.

And they decided that when they got the job done, but only when, they would have another administrative conference to approve it, and fix a date when the new table and the new set-up would go into effect.

There you have it. We will get the 21-Mc. band when the engineering job on the new frequency list is completed.

When will that be? Well, the job started just about two years ago, around the beginning of 1948. The United States, as did other nations, sent a sizable group of government and industry people to Geneva, where they have been living and working daily ever since. In Washington, a "home team" was organized and holds frequent meetings to keep the delegation at Geneva supplied with essential data. A year ago, the international group at Geneva set a target date of May, 1949, for completion of the new list, and October, 1949, as the date for a special conference to approve it. Unfortunately, the difficulties encountered in drawing up the new list were such that as of October they hadn't even completed the new station list. As of October, however, they did set new target dates: some time during this Spring for completion of the station list, and September of this coming year for the calling of the special conference to approve the job. Thus, it is possible to say that unless additional delays are encountered, we should expect the special conference to take place in September, 1950, to set a date for putting into effect the Atlantic City allocation table below 27.5 Mc. How soon after September that date will be is, at the moment, purely guesswork. Of course, the setting of an effective date by the international group is only part of the story; we won't actually get the use of the band in this country until the FCC has made appropriate amendment of our

amateur rules to include the new band. For our own part, we can't at this time visualize any real possibility of our getting all this accomplished during 1950.

We would be tickled to death if it turns out we were wrong about that!

OUR COVER

As the midpoint of the Twentieth Century arrives, we pause to take stock of the changing scenes in amateur radio over the past four decades. *QST*'s picture files have provided us with these shots of typical old-time stations, which would seem to illustrate excellently the many milestones in the technical development of ham radio.

1910: The Sixth District station of 12-year-old Hugh F. Richards, featuring a single-slide tuner, crystal detector (replacing a recently-discarded electrolytic detector), spark coil and gap.

1920: 9ZN, owned by ARRL Central Division Manager R. H. G. ("Matty") Mathews. Transmitters included two sparks and an i.c.w. tube set. Receivers were a Chicago Radio Lab "Paragon" and a Zenith model 1R.

1930: W9CPQ, John Kiesselbach operator. High-C tanks, mercury-vapor rectifiers, and an aluminum-paneled t.r.f. receiver were the pride of this ham shack.

1940: W9YQN, 'phone Sweepstakes winner for Kentucky, owned by W. E. Leatherman. Multi-stage rack-and-panel rigs, an ECO, and a band-switching superhet contributed to the performance of this outstanding contest station.

1950: ?

A Happy New Year

To Hams Everywhere

— The ARRL Hq. Gang

CONSTITUTION & BY-LAWS AND OFFICERS' REPORTS AVAILABLE TO MEMBERS

In April of each year the officers of the League make comprehensive written reports to the directors. The Board has made these reports available to interested members. The cost price is 75 cents per copy, postpaid. A copy of the Constitution & By-Laws will be sent to any member free upon request. Address the Secretary at West Hartford.

A High-Attenuation Filter for Harmonic Suppression

Inexpensive Unit of Simple Construction for TVI Reduction

BY A. M. PICHITINO,* W3NJE

• As many hams are finding out, the problem of keeping v.h.f. harmonics from getting into the antenna system is solved successfully when a good low-pass filter is installed — once the direct radiation troubles are cleaned up. The filter described in this article offers high attenuation in the TV bands together with simplicity of construction. The home-made condensers use a new dielectric material having many advantages in radio work.

THE problem of television interference is being faced by increasingly large numbers of amateurs as more areas become serviced by television broadcasting stations. Many amateurs who, a few months ago, were unconcerned about the TVI problem have had it forcefully brought to their attention by the opening of local TV stations. There are, too, those much more difficult situations where a viewer feels that the erection of a 150-foot tower and installation of elaborate preamplifiers entitle him to primary-service-area results even though he is a hundred or more miles from the station. Fortunately, this problem has been investigated by many amateurs and the considerable literature that has been published proves that TVI can be eliminated in even the most difficult cases.

It appears that conducted interference (direct or induced) and radiation from power or interconnecting leads can best be handled by proper shielding, by-passing and filtering, as has been competently described in the literature. The reduction and effective elimination of harmonic radiation from the output circuitry of the final-amplifier stage — other than direct radiation, which should be handled by complete shielding — is generally accomplished by one of three methods, and sometimes combinations of these methods.

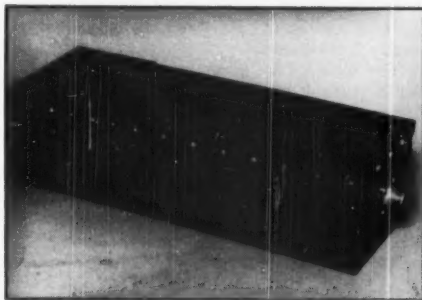
The first method is to install small, high-Q parallel resonant traps in the plate leads, the traps being tuned to the frequency of the harmonic that it is desired to reject. This method has

the objectionable features of being critical of adjustment, of accentuating harmonics under certain conditions of tuning, and of effectively changing the output-circuit operating conditions, which can reduce efficiency.

The second method is to mount capacitors with low inductance close to the tube plates to provide a low-impedance path for the harmonic currents, thus by-passing them around the tank circuit and antenna. This method, although moderately effective, requires special capacitors and usually does not permit optimum LC ratios at the higher frequencies.

The third method is to install a low-pass filter in the output coupling circuit to provide sufficient attenuation of the harmonics but still permit the fundamental to pass unattenuated. This method has the disadvantage that the filter must be designed for a specific impedance and cannot be used directly with transmission lines of different characteristic impedance than that of the harmonic filter.

This discussion will cover the practical design and construction of a low-pass filter which will provide 75 db. or more attenuation at any frequency above 54 Mc. This degree of attenuation is more than adequate, and plate traps or capacitors are not necessary. An output coupling circuit is also described which permits the use of balanced or unbalanced lines of any characteristic impedance.



The filter container is a 3 by 4 by 12 copper box, with all joints soldered except for the cover. The many screws holding the cover in place insure a "leakproof" contact between box and cover. A second coax connector is mounted on the far end of the box.

* Senior Research Engineer, The Franklin Institute Laboratories for Research and Development, Philadelphia, Penna.

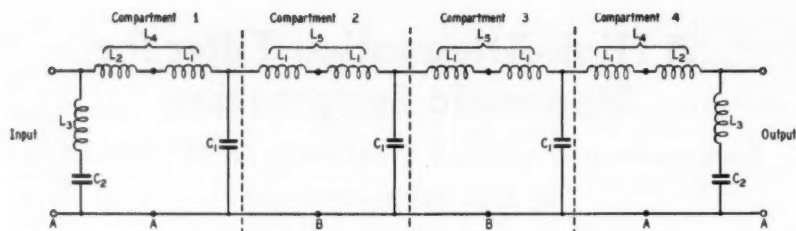


Fig. 1—The filter circuit. Constants are calculated as follows:

$$L_1 = \frac{Z_0}{2\pi f_c} = \frac{52}{6.28(45)10^6} = 0.184 \mu\text{h.}$$

$$L_2 = mL_1 = 0.61(0.184) = 0.112 \mu\text{h.}$$

$$L_3 = \frac{1-m^2}{m} L_1 = \frac{1-(0.61)^2}{0.61} \times 0.184 = 0.189 \mu\text{h.}$$

$$L_4 = L_1 + L_2 = 0.296 \mu\text{h.}$$

$$L_5 = L_1 + L_1 = 0.368 \mu\text{h.}$$

$$C_1 = \frac{1}{\pi f_c R} = \frac{1}{3.14(45)10^6(52)} = 136 \mu\text{fd.}$$

$$C_2 = \frac{mC_1}{2} = 41.5 \mu\text{fd.}$$

Design Considerations

First it is necessary to choose the characteristic impedance, Z_0 , of the filter. The Z_0 of the filter to be described has been chosen to be 52 ohms for a number of reasons: The filter can be inserted directly in any 52-ohm coax transmission line; it can be inserted in a coax link to feed an antenna coupler to match any type line; it prevents harmonic currents from flowing around the filter because the coax link can be easily terminated in a correct manner at a shielded transmitter cabinet; and it is easier to construct than higher-impedance balanced types.

Next, the cut-off frequency f_c of the filter must be selected. This choice is dependent upon a number of factors. A low-pass filter theoretically will pass all frequencies below f_c unattenuated and will attenuate all frequencies above f_c by an amount determined by the type of sections used in the filter. Since ideal circuit elements cannot be realized, practical filters will show a very slight amount of attenuation (less than 0.25 db. and called "insertion loss") below f_c , and appreciable attenuation usually starts somewhat before the design f_c is reached.

The filter we are going to construct is to pass all frequencies below 30 Mc. with a minimum of attenuation. It might appear that an f_c slightly greater than 30 Mc. would be desirable, but another factor enters here to make our choice of f_c considerably higher. The input impedance of the filter will vary considerably within the pass-band (below f_c) unless impedance-matching end sections are used, and even then under the most favorable end-section design the impedance will remain essentially constant only up to approximately 70 per cent of f_c . Therefore, we choose an f_c of 45 Mc. (70 per cent of 45 Mc. equals 31.5 Mc.) which is slightly higher than needed but ties into the last consideration relative to f_c .

The quantity m , which relates f_c to the frequency of maximum attenuation, f_∞ , of the end sections is given by the formula

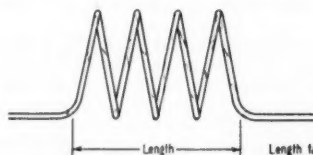
$$m = \sqrt{1 - \left(\frac{f_c}{f_\infty}\right)^2}$$

An m of approximately 0.6 must be used to obtain the best impedance characteristic. With an m of 0.61 (almost optimum) and an f_c of 45 Mc., the frequency of maximum attenuation, f_∞ , will fall at 57 Mc., the center of TV Channel 2. This is desirable because the second harmonic from a 10-meter transmitter is usually the most troublesome.

We must now decide upon the number and type of sections to be used in the filter. It will be convenient to use the metal box which will enclose the filter as the ground side of any capacitors

TABLE I
Coil-Winding Data

Coil	$\mu\text{h.}$	Inside Diameter	Length	No. of Turns	Wire Size
L_3	0.2	$\frac{1}{2}$ "	9/16"	4	12 enamel
L_4	0.31	$\frac{1}{2}$ "	$\frac{5}{8}$ "	5	12 enamel
L_5	0.37	$\frac{1}{2}$ "	$\frac{3}{4}$ "	6	12 enamel



Length taken to outside of coil, not center to center.

we may construct. If possible, we should choose sections of a type in which the capacitors may be tied to the common or ground side of the filter. Fortunately, sections of this type are feasible and are called "series m -derived" in the case of the end sections (actually half sections). The "constant K , full 'T'" type meets the requirements in the case of the intermediate sections. In general, the amount of attenuation is proportional to the number of sections employed. Three sections will normally provide better than 60 db. attenuation, which is sufficient for almost all installations, but we shall employ four full sections for good measure, particularly since the insertion loss is not measurably greater.

Fig. 1 shows the configuration of the final filter, with the series m -derived end half-sections shown between points A-A and the three constant- K full-"T" midsections shown between points A-B, B-B, and B-A.

Construction

The filter enclosure consists of a metal box 3 inches high, 4 inches wide and 12 inches long. It is made of 18-ounce 0.023-inch hard-drawn copper and is divided into four equal-sized compartments by means of three $\frac{1}{16}$ -inch-thick brass partitions. These partitions have $\frac{3}{8}$ -inch diameter holes in their centers; the holes should be drilled before soldering the partitions into the box. The box corners should be soldered tightly, along with the partitions, because the tighter the box electrically the better the attenuation. The box cover is made with a $\frac{3}{8}$ -inch lip on all sides and is fastened by means of metal screws $\frac{3}{4}$ inch apart. The screws should not be placed farther apart as this will reduce the attenuation. The top cannot be soldered because the intense heat would melt the dielectric of the capacitors. The box construction is shown in the photographs. It will be observed in one of the photographs that the top edge of the box has been folded back upon itself, thus providing greater rigidity and a double wall thickness for the metal screws.

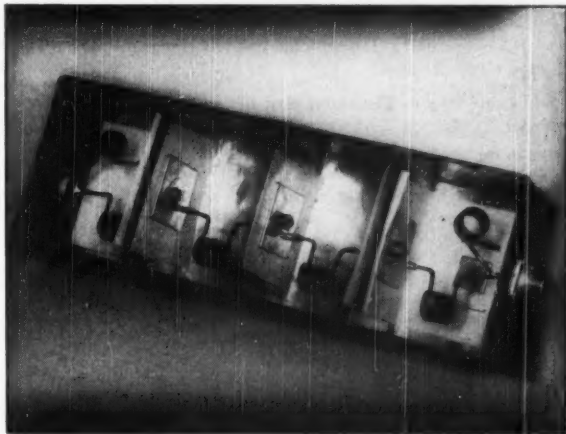
The formulas for the filter inductors and capacitors are given under Fig. 1. The inductor winding information is contained in Table I, where it can be observed

that L_1 and L_2 have been combined to form one inductor, L_4 , and two L_1 inductors combined to form L_5 . It can also be observed that L_3 , L_4 and L_5 have been increased slightly in value (compared with the calculated values) to compensate for the effect of the shielding which reduces the inductance.

The capacitors are fabricated by using flat $\frac{1}{16}$ -inch brass plates in conjunction with the copper box as the ground plate. The C_1 capacitors are of the feed-through type and the C_2 capacitors are straight ground type. Fig. 2 shows the capacitor construction and formula. In computing the size of plates the loss of area due to the $\frac{5}{16}$ -inch holes must be kept in mind, along with the increase in area due to the $\frac{3}{4}$ -inch square plate used in C_2 . Fringe effect may be neglected in these computations. The plate edges and corners should be rounded and the plates polished with very fine abrasive cloth. The capacitors are assembled using 8-32 brass hardware.

The dielectric used is a comparatively new plastic called "Teflon." It has very desirable characteristics, such as low losses, high voltage breakdown, uniform thickness, can stand moderately high temperatures compared with most plastics, and is easily worked. Although the material used in the filter is only 0.015 inch thick, it will withstand more than 15,000 volts. A word of caution is in order, however, in making the 8-32 clearance holes in the center of each piece of Teflon. Do not attempt to pierce the holes with a sharp pointed instrument as the Teflon will tear and the hole will be off-center and jagged. Use a sharp pointed knife to cut the material away, or drill through carefully using a drill press (yes, in spite of its being only 0.015 inch thick and a plastic!). If available, a leather punch would be ideal.

A few suggestions concerning the assembly of



An inside view of the filter, showing the flat-plate condensers with sheet Teflon dielectric. The partitions and bottom of the box also serve as condenser plates. Careful soldering at all joints insures good shielding between sections.

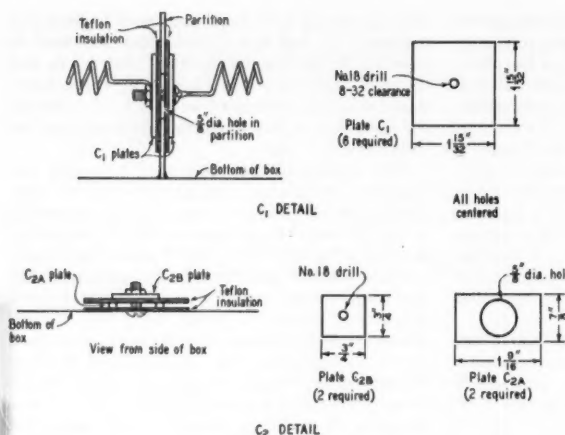


Fig. 2 — Construction of the capacitors C_1 and C_2 . Note that C_1 makes use of both sides of the partition. Capacitor dimensions are calculated as follows:

$$C = \frac{0.2245K(N-1)A}{t} \mu\text{fd.}$$

where K = dielectric constant of insulation (2.1 for Teflon),
 N = number of plates,
 A = area of one side of one plate in square inches, and
 t = thickness of dielectric in inches (0.015 in.).

To find area use

$$A = \frac{Ct}{0.2245K(N-1)}$$

the filter will save time. Soldering lugs should be crimped and soldered to the inductors as shown in the photograph. The lugs should be bent to allow clearance for tightening the bolts with pliers or a small wrench. The bolts should be carefully centered in the $\frac{5}{8}$ -inch holes, because here the dielectric is air and the breakdown voltage is lowest, aside from the coax terminal connectors. The easiest way to assure centering is to use a carefully-cut $\frac{5}{8}$ -inch diameter Teflon disk with an accurately-centered No. 8 clearance hole. One of these disks is placed between the two pieces of dielectric in each capacitor where it will center the assembly. Inductor L_3 is carefully butt-soldered to a corner of plate C_{2A} prior to assembly. In fact, all soldering except that necessary to attach L_3 and L_4 to the standard coax terminal fittings mounted on each end of the box should be done prior to mounting the dielectric, to avoid possible damage due to excessive heat.

The dielectric shown in the photographs is a carry-over from earlier experiments and is much larger than necessary. It need extend only $\frac{5}{16}$ inch beyond all plate edges.

Coupling to Transmission Lines

If the transmission line is 52-ohm coax, the filter is merely inserted in the line with the box grounded.

Considerable time was expended in an attempt

to provide a coupling system that would not require tuning, but with little success. While many antenna systems would load without difficulty, antennas with really flat lines could not be fed. After detailed investigation it was decided to go to the straightforward coupler shown in Fig. 3. This coupler has the disadvantages of requiring L and C to be of the same ratings as the final tank and requiring that another circuit be tuned. However, the tuning can be made quite broad by moving the taps toward the coil ends to the point where the Q is lowered as much as possible while still permitting the desired loading. The adjustment of this type coupler is described in detail in the *Radio Amateur's Handbook* and the 1949 *A.R.R.L. Antenna Book*.

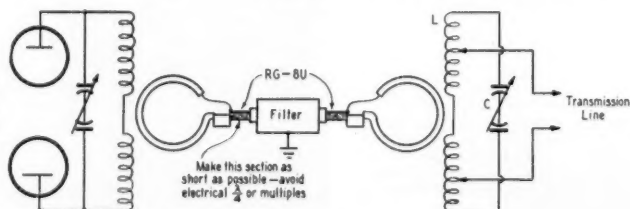
References 1, 2, 3 are recommended reading on the subject of coupling to flat lines. It is also recommended that a Faraday screen be used at the transmitter end of the link as in Fig. 3.

Performance

The filter provides greater than 75 db. attenuation above 54 megacycles. The insertion loss is less than 0.25 db. The power-handling capability

(Continued on page 104)

Fig. 3 — Recommended type of antenna coupler for use in cases where the transmission line is not 52-ohm cable.



¹ Goodman, "Coupling to Flat Lines," *QST*, August, 1947.

² Paddon, "Parallel Standing Waves," *QST*, January, 1948.

³ *A.R.R.L. Antenna Book*, 1949 ed., pp. 122-23, 135.

Antenna Polarization on 144 Mc.

A Report on Tests with Flop-Over Arrays

BY EDWARD P. TILTON,* WHDQ

"In two years of work on 144 Mc. with vertical antennas the best I could do was about 60 miles. Since I went horizontal I'm working 175 miles every night, and making contacts up to 500 miles when the band is good. I've been keeping 2-meter skeds with W— for months, and though we're only 90 miles apart we never made a contact until we changed over to horizontal antennas. Now we work easily every night. We think it significant that all the real DX has been worked with horizontal antennas."

As so it goes! Correspondence received by the writer, in more or less the above vein, would, if taken at face value, make it appear that two-thirds of the 2-meter enthusiasts of the country are committing the folly of the century by continuing to work with vertical antennas. To one who has been in the middle of this polarization controversy for years it appears that there are few subjects on which more false evidence has been gathered and reported than that of antenna polarization for v.h.f. work.

By now almost everyone should be familiar with the arguments. They have been summarized often in these pages,¹ so we need not go through it all again, except to say that there are reasons (other than the ultimate one of which provides the more readable signal) with considerable logic in back of either position.

This report will be concerned only with which polarization provides the best communication over paths that are peculiar to amateur operation. There have been numerous commercial surveys for the purpose of determining polarization policy for television, f.m., and mobile services. The results are well known, and are obvious to any city dweller who bothers to look up these days: the broadcasting services are horizontal and the mobile services are vertical; both of them for solid logical reasons.

But since the amateur operation takes on some of the aspects of both the broadcasting and mobile services the choice is not so easy. Nor are the conclusions drawn from commercial investiga-

* V.H.F. Editor, QST.

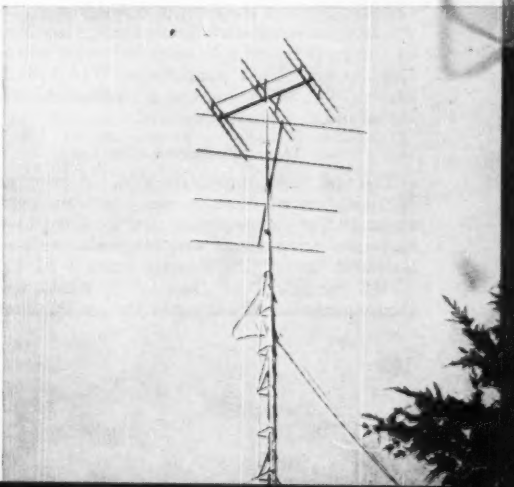
¹ "V.H.F. Antennas — Horizontal or Vertical?" QST, Jan., 1947, page 35; "World Above 50 Mc.," QST, March and May, 1949.

The eternal question, horizontal or vertical, is symbolized by this shot of the 12-element flop-over array at WHDQ, stopped midway between the two positions. The lower array is a 4-element 50-Mc. job.

tions necessarily applicable to our problems. Commercial interests have little concern for the factor most dear to many 2-meter enthusiasts — which polarization will produce the stronger and more readable signals at 400, 500, 800, or X miles; whatever distance will exceed the best they have been able to do so far. We will have to find out for ourselves, and mental bias in favor of one polarization can only becloud our efforts.

How, then, shall we go about it? Remember, we are interested at the moment only in which polarization provides the best communication; we are not going to compare one type of antenna with another. The following requirements must be met if we are to get a reasonable answer: (1) The antenna pattern must be the same in both planes. This rules out simple parasitic arrays, 16-element jobs, and many other justly popular designs that tend to favor one polarization over another. Our test array must be square or round, with uniform dimensions about the feed point. (2) Its position must not shift with respect to the array at the other end, when the change of polarization is made, except for rotation in a vertical plane about a central point.

These specifications narrow down the possibilities considerably. We can see that our work must be done with flop-over arrays at each end. They must be pivoted about a central point, so that their separation and their height above ground do not change with polarization. Even with designs meeting these requirements there will be enough variables; use of anything else is almost certain to result in confusing evidence. Obviously there are not many 2-meter stations equipped to conduct polarization checks effectively.



The accompanying photograph shows the installation used at W1HDQ for the past several months. A 12-element array mounted 50 feet in the air is pivoted on a door hinge at the middle of the boom. It is rotated electrically from the operating position, but the flop-over operation involves ropes and pulleys. There is a well-beaten path from the shack to the base of the tower as a result of this latter consideration. Scores of polarization tests have been made using this array with 2-meter stations in 5 call areas, at distances ranging from 12½ to 450 miles. They have been made in several directions, under all sorts of propagation conditions, over paths that run the gamut from easy to very difficult.

Only two stations were found to have arrays conforming to the specifications outlined above. W1PIV, East Freetown, Mass., 100 miles, and W3KBA, Dover, Penna., 250 miles, both have 32-element arrays arranged for flop-over operation. Flop-over folded dipoles, erected especially for these tests, were in use at W1HDF, Elmwood, Conn., and W1OAX, South Coventry, 12½ and 30 miles respectively. W2WFB, Schenectady, N. Y., 90 miles, had four half waves in phase with reflectors (four high when horizontal). W2PAU, Westmont, N. J., and W2EH, Collingswood, about 160 miles distant, both had 10-element arrays of unusual design, consisting of two 5-element jobs spaced a full wavelength apart. All the above arrays were arranged for flop-over operation.

W4IKZ, Lynnhaven, Va., 400 miles, has two 10-element jobs of identical design, mounted one above the other. W1AAR, Boston, 95 miles, uses two 5-element arrays on different supports, with the horizontal much lower, and seemingly in a poorer spot. W3LFC/2, Toms River, N. J., also compared two 5-element jobs, but in his case the horizontal was higher. W8UKS, Burton, Ohio, 450 miles, used four stacked dipoles with a screen reflector for horizontal, and 16 driven elements and a screen for vertical. W1MNF, East Orleans, Mass., 150 miles, compared a 14-element vertical against a 7-element horizontal. W2SFK, Glens Falls, N. Y., 110 miles, has a 16-element vertical and an 8-element horizontal. Checks were also made with W2PAU when he was using two identical 5-element arrays mounted on the same boom, with relay switching of the feed line for instant comparisons. W4AO, Falls Church, Va., 300 miles, had a 16-element horizontal and an 8-element vertical.

Results

The first tests were made with the array at W1HDQ mounted on a temporary support, about 18 feet above ground. During this period horizontal comparisons were made also with an 8-element array (the 2-meter portion of the "VHF Sandwich" of June QST), which was then mounted on the tower in the position now

occupied by the flop-over job. The inconsistent results obtained in comparing separate antennas of the same polarization show how misleading polarization tests can be if conducted with separate arrays. Repeated tests showed that first one and then the other of these two horizontal arrays produced the stronger signals. One night in June W4IKZ and W2EH were running two S-units stronger on the high antenna. Then, less than 24 hours later, W4IKZ was averaging one S-unit stronger on the lower array.

When we first embarked on this program we ran into a series of experiences that seemed to show a vast superiority for horizontal. Every check seemed to provide a margin of one to three S-units in favor of the horizontal systems, but as we gathered more data, and began correlating results in terms of the maximum and minimum signals observed on both polarizations, the margin between them narrowed. Particularly, in the case of nightly skeds with W3KBA, we found that the S-meter readings varied over almost exactly the same range on either polarization. There was an important difference, however: communication was carried on more solidly with our arrays in the horizontal position. It was a small margin, but it was enough to permit an appreciably higher percentage of readability. This is attributable, at least in part, to the slightly better signal-to-noise ratio on horizontal, and also to seemingly less severe fading. Several times when the going was rough the no-signal periods lasted longer on vertical. This is significant, as this 250-mile hop is a tough one when conditions are not extra good.

Another difficult path was the 100-mile mountainous hop to W2SFK. Looking in that direction from the top of the tower at W1HDQ the horizon is only about 150 yards away, and within a few miles the elevation is more than 400 feet higher than our antenna. It's rough country all the way, and though it is a consistent c.w. schedule, signals are seldom strong enough for voice work. On this hop vertical has an advantage of about 4 db., resulting from John's 16-element vertical and 8-element horizontal. Horizontal is not good enough to overcome this advantage, and we find our circuit consistently better with vertical.

One oddity, as yet unexplained, except by horizontal protagonists, is the tremendous improvement experienced when W1AAR puts his low horizontal into service. Several checks indicate nearly 15 db. advantage, yet the horizontal array is down behind trees and buildings and the vertical job is high in the clear. He has found this advantage in numerous checks with other stations as well as with the writer.

Also a surprise was the apparent superiority of horizontal on short paths, such as to W1HDF and W1OAX. Repeated several times each, checks over these paths showed 10 to 15 db. in

(Continued on page 104)

16th ARRL International DX Competition

*C.W.: Feb. 10th-12th and March 10th-12th;
'Phone: Feb. 17th-19th and March 17th-19th*

It's time again to ready your station for the ARRL International DX Competition, to be held in February and March of this year. This contest, the sixteenth of its kind, gives an opportunity for all W and VE operators to add new countries to their DX totals, other stations to fill in for their WAS and WAVE awards, and everyone to match DX operating skill with other

must use the special form shown in the sample.

Entries by multiple-operator stations are encouraged and will be listed, but only single-operator stations will be eligible for the special certificate awards offered to the top 'phone and c.w. scorer in each country and ARRL section. Multiple-operator scores can be grouped with single-operator scores in club competition, however, and a handsome gavel is offered to the club with the highest aggregate score. Within a club, single-operator entries can compete for the "club-certificate" awards given to the highest c.w. and 'phone scorers.

If you're new to the DX Contest, it won't take you long to catch on. During the contest period, stations outside of the U. S. and Canada will call "CQ W/VE" or "CQ TEST" and will exchange numbers as shown in the sample elsewhere on these pages. You can try a "CQ DX" or "CQ TEST" if you're a W or VE, but past experience shows that this pays off *very seldom*. On c.w., Ws and VEs have quotas but this doesn't apply to 'phone. Keep your log carefully, and send a copy of it, in the form shown, to ARRL. Free contest forms are available from ARRL Headquarters, West Hartford, Conn., upon request. Get your station working at top efficiency, make no social commitments for the important week

Explanation of DX Contest Exchanges

Exchanges	RST Report of Station Worked	Three-Digit Number Representing Power Input
Sample (c.w.)	579	150
Sample ('phone)	57	500

operators in his country or ARRL section. But, whether you have 9 or 9 hundred watts, whether you work 2 or 2 thousand stations, whether you have a wire out the window or a 7-element antenna, you can have a whale of a lot of fun in this annual event.

As in the past, two week ends are devoted to c.w. operation and two to 'phone operation, giving everyone an opportunity to participate in four week ends of hot activity. The rules are practically the same as those of last year, except for three modifications. The c.w. quota for W stations is raised to 4 and for VEs to 6. Recent experience has shown that stations in certain foreign countries have difficulty making contacts during the second week of the contest after W and VE participants have filled their quotas. The increases should help to make more contacts available for foreign participants in the latter part of the contest. The old self-assigned number of past contests is replaced this year by a three-figure number representing the power input of your transmitter. If the input is 250 watts, your number is 250. If you run only 75 watts, use the number 075. Full kilowatts have a choice — they can use either 000 or 999. If your input is different on different bands, change the number to approximate the input figure, but don't bother about 0.1 per cent accuracy on any band — the usual approximation is adequate. The requirements concerning log forms have been changed. Foreign amateurs use, for both the c.w. and 'phone sections of the contest, the first form shown; W and VE 'phone contestants also use this form. W and VE c.w. contestants, however,

CONTEST TIMETABLE

C.W. Section:

Time	Starts	Ends
GCT	Feb. 10th 2400	Feb. 12th 2400
AST	Feb. 10th 8:00 P.M.	Feb. 12th 8:00 P.M.
EST	Feb. 10th 7:00 P.M.	Feb. 12th 7:00 P.M.
CST	Feb. 10th 6:00 P.M.	Feb. 12th 6:00 P.M.
MST	Feb. 10th 5:00 P.M.	Feb. 12th 5:00 P.M.
PST	Feb. 10th 4:00 P.M.	Feb. 12th 4:00 P.M.

The second period of this contest starts at these same hours Mar. 10th.

The second period of this contest ends at these same hours Mar. 12th.

'Phone Section:

GCT	Feb. 17th 2400	Feb. 19th 2400
AST	Feb. 17th 8:00 P.M.	Feb. 19th 8:00 P.M.
EST	Feb. 17th 7:00 P.M.	Feb. 19th 7:00 P.M.
CST	Feb. 17th 6:00 P.M.	Feb. 19th 6:00 P.M.
MST	Feb. 17th 5:00 P.M.	Feb. 19th 5:00 P.M.
PST	Feb. 17th 4:00 P.M.	Feb. 19th 4:00 P.M.

The second period of this contest starts at these same hours Mar. 17th.

The second period of this contest ends at these same hours Mar. 19th.

LOG, 16TH A.R.R.L. INTERNATIONAL DX COMPETITION

Sheet 1 of 1 Call ARRL Section or Country

Date & Time	Station Worked	Country	Record of New Countries for Each Band					Serial Numbers		Points
			3.5	7	14	27	28	Sent	Received	
Feb. 18 0005 GCT	VP9E	Bermuda			1			56375	57080	3
Feb. 19 1300	PA0GN	Netherlands					1	58375	47075	3
1306	G6CL	England					2	58375	46180	3
1345	PA0RA	Netherlands					2	56375	59080	3
2030	LU7AZ	Argentina					3	58375	57750	3
2310	VP9X	Bermuda			1			57500	56050	3
Mar. 18 1020	ZL1MR	New Zealand			2			58500	58075	3
1035	VK2TI	Australia	1					47500	46100	3
1105	VK2RA	Australia	1					46500	45100	3
1421	PA0LQ	Netherlands					3	45375	57100	3
Mar. 19 0925	TF3EA	Iceland			3			57500	57050	3
1245	G2MI	England				3			46125	2
1255	G3KP	England				3		56375	57100	3
1350	G2MI	England				3		57375		1
1430	G5BA	England				3		46375	55100	3
2320	KZ5AW	Canal Zone			4			58500	58500	3

Sample of report form that must be used by foreign c.w. and all 'phone participants.

ends, read the rules to acquaint yourself with the pattern, and then get set for more DX per kilocycle per hour than your poor crystal filter and "Q5-er" have ever had to cope with before.

Rules

- 1) **Eligibility:** Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.
- 2) **Object:** Amateurs in the continental U.S. and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.
- 3) **Conditions of Entry:** Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Award Committee.
- 4) **Entry Classifications:** Entry may be made in either or both the 'phone or c.w. sections; c.w. scores are independent of voice scores. Entries will be further classified as single- or multiple-operator stations. Single-operator stations are those at which one person performs all the operating functions. Multiple-operator stations are those obtaining assistance, such as from "spotting" or relief operators, or in keeping the station log and records.
- 5) **Contest Periods:** There are four week ends, each 48 hours long: two for 'phone work and two for c.w. The c.w. section starts at 2400 GCT, Friday, February 10th and Friday, March 10th, ends 2400 GCT, Sunday, February

Sample of report form that must be used by W/VE c.w. participants. When a station is worked for less than the maximum number of points allowed (as for example the contact with G2MI shown above), the additional contact to make up the points not earned in the first contact should be entered at the bottom of the sheet. Canadian entrants should allow two blocks for each country, but may record no more than six contacts therein. A separate set of sheets should be used for each band.

LOG, 16TH INTERNATIONAL DX COMPETITION

Call ARRL Section
Band Mc. Sheet 1 of 3

	Station Worked	Date	Time (GCT)	Number Sent	Number Received
Netherlands	PA0GN	2/11	1300	589450	479075
	PA0RA	2/11	1345	569450	579080
	PA0LQ	3/11	1421	459450	578100
England	G6CL	2/11	1306	589450	469150
	G2MI	3/12	1245		469125
	G3KP	3/12	1255	569450	579100
	G5BA	3/12	1430	469450	559100
Argentina	LU7AZ	2/11	2030	589450	579750
	G2MI	3/12	1350	579450	

12th and Sunday, March 12th. 'Phone section starts at 2400 GCT, Friday, February 17th and Friday, March 17th, ends 2400 GCT, Sunday, February 19th and Sunday, March 19th.

6) **Valid Contacts:** In the 'phone section, all claimed credits must be made voice-to-voice. In the telegraph section, only c.w.-c.w. contacts count.

7) **Exchanges:** Each participating operator will use three figures to represent the approximate transmitter power input. C.w. contestants will exchange six-figure numbers, each consisting of an RST report plus the three "power" numbers. (Examples are given in the sample log.) 'Phone contestants will exchange five-figure numbers, each consisting of a Readability-Strength report plus the three "power" numbers. If the input power varies considerably on different bands, the "power" number should be changed accordingly.

8) **Scoring:**

a) **Points:** 1 point is earned by a W (K) or VE station upon receiving acknowledgment of a number sent, and 2 points upon acknowledging a number received. Two points are earned by any other station upon receiving acknowledgment of a number sent, and 1 point upon acknowledging a number received.

b) **Final Score:** W (K) and VE stations multiply total points earned under Rule 8(a) by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 8(a) by the sum of the number of W (K) and VE licensing areas worked on one band plus the number of W (K) and VE licensing areas worked on each other band.

Countries will be those on the ARRL Countries List. There are 18 licensing areas: 10 in the United States, 8 in Canada.

9) **Repeat Contacts:** The same station may be worked again for additional points if the contact is made on a different frequency band. The same station may be worked again on the same band if the complete exchange for a total of three points was not made during the original contact on that band.

10) **Quotas:** The maximum number of points per country per band which may be earned by W (K) stations in the c.w. section is 12, and contacts made on the same band with the same country after the quota is filled will not count. Thus complete exchanges with 4 stations in one country on one band fill the band quota for that country. The maximum number of points per country per band which may be earned by VE stations in the c.w. section is 18, and contacts made on the same band with the same country after the quota is filled will not count. Exchanges with 6 stations in one country on one band are thus permitted VE participants. There is no quota for stations in the c.w. section outside of W (K) and VE. There is no quota for any station in the 'phone section.

11) **Reporting:** Contest work must be reported as shown in the sample form. Each entry must include the signed statement as shown in that example. Contest reports must be mailed no later than April 20, 1950, to be eligible for QST listing and awards.

12) **Awards:** To document the performance of participants in the Sixteenth ARRL International DX Competition, a

(Continued on page 108)

SUMMARY, 16TH A.R.R.L. INTERNATIONAL DX COMPETITION

Entry Call..... ARRL Section..... or Country.....
(C.W. or 'Phone)

Name..... Address.....

Transmitter Tubes.....

Receiver..... Antenna(s).....

(Logs from W or VE show number of foreign countries worked. Logs from other countries show number of U.S.A. and Canadian call areas worked.)

Bands	3.5 Mc.	7 Mc.	14 Mc.	27 Mc.	28 Mc.	Total
Nr. Countries QSOed	1		4		3	* 8
Number of contacts						15

Number of Different Countries Worked..... Number of Hours of Station Operation:.....

Assisting Person(s): Name(s) or Call(s).....

45..... 8..... =..... 360.....
(Points)..... (Multiplier)..... FINAL SCORE

Participating for Club Award in the.....
(Name of Club)

I certify, on my honor, that I have observed all competition rules as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best of my belief. I agree to be bound by the decisions of the ARRL Award Committee.

Operator's Signature

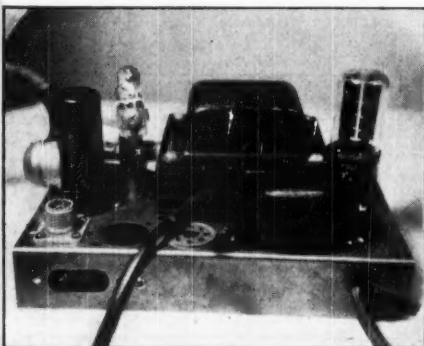
* Figure in this box is multiplier.

Sample of summary sheet that must accompany all reports.

A One-Tube VFO Amplifier

BY GERALD T. WHITE,* W3LTR, AND L. W. SIECK,** W4KMG

THERE is no need these days to elaborate on the advantages of VFO operation. For those operators who use one of the LM-series heterodyne frequency meters (the BC-221 is quite similar), this article will show one method for coupling these units to a subsequent amplifier or frequency-multiplier stage, and there is no reason why the same principle cannot be applied to any VFO. All in the series, with the exception of the LM and the LM-1, have a fundamental output in the high-frequency range of from 2 to 4 Mc. The calibration is accurate, the stability is good, the unit is well shielded, and internal voltage regulation is furnished.



A one-tube amplifier for using a surplus LM frequency meter as a VFO. It is mounted on the chassis with the power supply.

An adequate amplifier for one of these units presents a problem. Various circuits for such an application have been published, but all of those that were tried failed to meet our particular requirements. They either had to be retuned with a change in frequency or they required too many tubes, or both. The goal was a one-tube amplifier and, of all of the various tubes that were tried, the 6AG7 seemed best suited for the job. The 6AG7 has a very high mutual conductance, and it is rated at 140 volts peak output over a video band extending to 4 Mc. To simplify construction and to obtain even greater output, the amplifier bandwidth was confined to a range from about 3.4 to 4.1 Mc. It was found that the resultant output ranged from 155 to 105 volts over the

range of 3.5 to 4.0 Mc., when working into a 27,000-ohm resistor, with no retuning of the amplifier.

It was found that by-passing the plate of the oscillator to ground with a 0.1- μ fd. condenser made no noticeable change in frequency, indicating that considerable reactive loading could be applied without affecting the accuracy of calibration. About 3 volts peak was measured at the plate before circuit modification. After connecting a one-foot length of coaxial line to the plate, the voltage dropped to 2 at 2 Mc. and to 0.75 at 4 Mc. Greater voltage was obtained by placing an inductance at the amplifier grid end of the coaxial cable and tuning it, with the cable capacity, to 4 Mc. The tuned inductance did not function as well when placed at the LM end of the cable.

Since adjustable inductors were not available at the time, trimmers were placed across the coils to tune out the reactance. About 5 to 7 peak volts was obtained at the amplifier grid, over a range of about 300 kc. It is believed that superior results would be obtained by using slug-tuned coils and no additional capacity, since the lowered capacity would result in a lower-Q circuit. A plate tank circuit tuned to the same frequency as the grid circuit made the amplifier regenerative and decreased the bandwidth. The final answer was found in stagger-tuning three circuits, one in the grid and two in the plate, as shown in Fig. 1. Almost any desired response curve can be obtained by the relative tuning of these three circuits.

Construction

The amplifier was built on the same chassis as the power supply for the frequency meter and the 6AG7 amplifier. It is mounted in the bottom part of the carrying case, as can be seen in one of the photographs. The grid coil is mounted under the chassis, and the trimming condenser, C_1 , can be adjusted through a hole. The two plate coils are mounted above the chassis, at right angles to each other.

The power supply delivers 340 volts at 40 ma. When using high voltage like this on the LM, the internal jumpers in the frequency meter must be set for the high-voltage condition.

Low-capacity cable (RG-53/U) was used between the LM and the 6AG7 grid circuit, and low-capacity "automobile antenna lead-in" cable was used from the plate circuit to the following stage in the transmitter. The "automobile" line

* Lieut., USN; Electronics Test, NATC, Patuxent River, Md.

** 1063 No. Montana St., Arlington, Va.

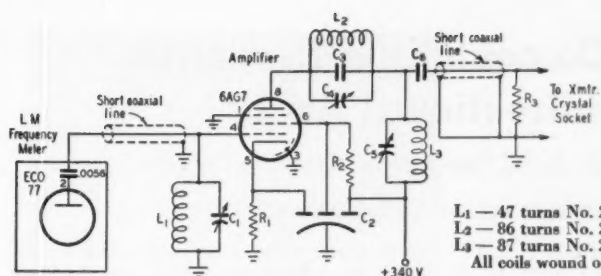


Fig. 1—Wiring diagram of the VFO amplifier.

C₁, C₄, C₅—3- to 30- μ fd. mica compression trimmer.

C₂—3 \times 0.1- μ fd. 400-volt bath-tub.

C₃—10- μ fd. ceramic.

C₆—0.01 μ fd., 600 volts.

R₁—100 ohms, $\frac{1}{2}$ watt.

R₂, R₃—27,000 ohms, 1 watt.

L₁—47 turns No. 26 enam., close-wound (4 Mc.).

L₂—86 turns No. 26 enam., close-wound (14 Mc.).

L₃—87 turns No. 26 enam., close-wound (3.5 Mc.).

All coils wound on $\frac{1}{2}$ -inch diameter forms.

was the lowest-capacity line that could be found. It is available in 3-foot lengths, and could have been used between the LM and 6AG7 circuit as well.

Operation

The over-all response of the circuits can be determined by measuring grid current in the stage driven by the 6AG7, or by using a v.t.v.m. across the 27,000-ohm resistor. The final adjustment of the amplifier should, of course, be made while it is connected to the transmitter, to include the effect of loading across R₃. After adjustment of the tuned circuits, we were able to get about 150 volts from 3.5 to 3.75 kc., tapering down to 105 volts at 4 Mc. This is plenty to drive any of the usual crystal-oscillator tubes.

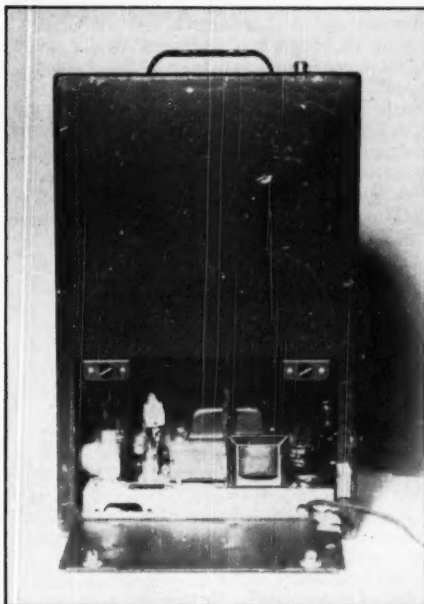
The LM VFO and 6AG7 amplifier combination has been in use at W4KMG for the past two years and has proved to be quite satisfactory. It drives a 6L6 doubler, which used to be the crystal-oscillator tube, at about 6 ma. grid current. This 6L6 drives another 6L6 doubler to 14 Mc., followed by a TZ40 running at 100 watts input. On c.w., the two 6L6s are keyed in the cathode circuit. In covering the range 14.0 to 14.4 Mc., the only stage that requires retuning is the TZ40 plate tank and, of course, the LM frequency control. An extra set of contacts on the send-receive relay in the transmitter is wired in parallel with the plate switch on the LM, through spare terminals on the LM power plug. Thus the LM is turned on simultaneously with the transmitter, or independently by the switch on its panel.

(Since this article was prepared, several other versions of the amplifier have been built. In these the 6AG7 was mounted horizontally on the back of the LM. Terminal strips were used to take the ground, heater, plate power and r.f. output leads, thus eliminating the coax cable in the grid circuit. The grid coil is wound on a 1-megohm resistor, and adjusted to resonate with the stray capacities in the circuit. The plate capacitors were eliminated by using slug-tuned coils. The reduction of circuit capacities increased the bandwidth of the amplifier considerably, with no appreciable reduction in gain.)

FEED-BACK

In Mack Seybold's article, "The Design of Low-Pass Filters," December *QST*, the value of capacitance shown in Fig. 5, page 19, should be 1000 μ fd. instead of 100 μ fd. At the top of page 22 the figures in the denominator should be 10⁶ instead of 10. On page 24 the captions "Balanced" and "Unbalanced" should be transposed. In Fig. 15 the vertical scale should read 0 to 70 instead of 10 to 80.

**SWITCH
TO SAFETY!**



The amplifier and power supply mount in the base of the LM carrying case.

Folded Elements in a Reversible Unidirectional Array

A Compact Wide-Band Fixed Beam Antenna for 14 Mc.

BY BRUCE KELLEY,* W2ICE/W2QCP

HAVING witnessed the recent splurge in TV directive antennas, many of which are of the stacked type, and after talking with some of the v.h.f. boys, it was concluded that there might be something to this business of confining vertical directivity after all. There is no denying that many of us using simple half-wave antennas are wasting power in radiation at vertical angles so high as to be of no value in the kind of communication in which most of us are chiefly interested. Through stacking, one can bring more of this wasted energy down to useful angles.

Like many others, we've been backward in considering stacked arrays for 14 Mc. because it was assumed that the required dimensions, particularly the height, would be prohibitive. However, some study of the problem revealed that a worth-while unidirectional array of small proportions is readily possible.

The original antenna at W2ICE is shown in Fig. 1A. This type of radiator is a three-quarter-wave folded arrangement, which differs from the more conventional half-wave folded dipole in that the return center is left open, the wire not forming a continuous loop. The gain provided by the additional length is equivalent to that obtained with the extended double-Zepp arrangement. A second section was placed under the original, forming a modified version of the compact Lazy H as described by Kraus many years ago.¹ This is shown here in the sketch of Fig. 1B. However, this arrangement differs from that described by Kraus in that the spacing between the upper and lower elements is less than a half wave and the antenna is designed for 14 Mc. instead of 28 Mc.

Vertical Spacing

While the vertical spacing between upper and lower elements may be anywhere from 24 to 34 feet ($\frac{3}{8}$ to $\frac{1}{2}$ wavelength), one should use the greater spacing if possible. However, experience here has shown that by the time one gets the lower element above the ground any appreciable distance, the required pole height really starts to go up. The open line between the upper and lower sections must always be a half wave in length, regardless of the vertical spacing, and with no transposition. We had only 38-foot poles,

so the spacing between the upper and lower elements was made about 29 feet, with the lower section about 8 feet off the ground. Over a foot was lost in drag at the pulleys and insulators. Since the electrical spacing is 34 feet and the physical but 29 feet, a loop was necessary to take up the difference. For constructional convenience it is best to have the take-up loop at the bottom element. The antenna is fed in the electrical center of the half-wave vertical section. The feeder should leave the half-wave section at as nearly right angles as possible before going down, as indicated in Fig. 1C.

Three of these Lazy Hs were constructed and

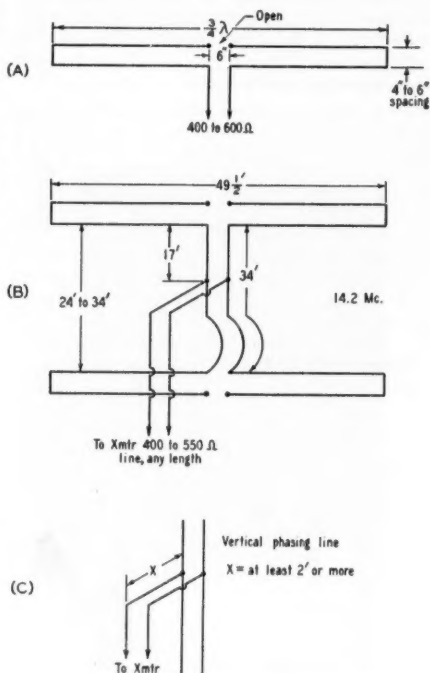
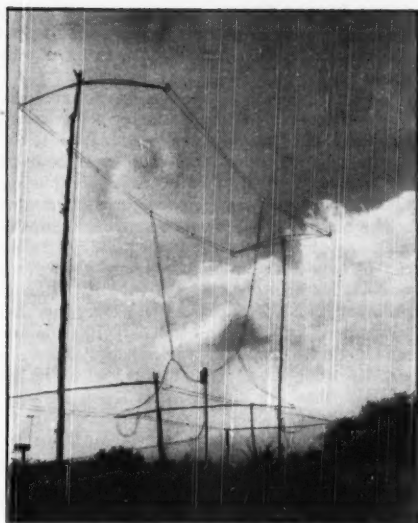


Fig. 1—A—Simple three-quarter-wave folded antenna. B—Lazy H type antenna with three-quarter-wave folded elements. C—Feeder connection to phasing section.

* 181 Chili Ave., Rochester 11, N. Y.

¹ *Radio*, October, 1939.



The Lazy H reversible array at W2ICE shown here is strung from rough-cut poles. The poles are only 38 feet high. The lower set of elements is eight feet off the ground and the spacing between upper and lower elements is 29 feet. The direction change-over relay is in the box on the short pole at the center.

placed to form a cartwheel. A common center pole served to support one end of all three antennas, with each antenna leaving the center pole at intervals of 120 degrees of arc. A 500-ohm open line 250 feet long was run from the transmitter to two d.p.d.t. relays. Through these relays it was possible to obtain six directions (each antenna being bidirectional) for a coverage of 360 degrees. This system was left up for a period of six months with good reports locally as well as from DX.

Some trouble was experienced in making all three arrays load exactly the same when switching from one to another. This difficulty was overcome by experimenting with the lengths of the feeders between the phasing sections and the relay box and by avoiding, as much as possible, the running of the feed lines parallel to the antenna proper.

The only comment we can make about this type of Lazy H is that we found the horizontal pattern extremely broad. With the arrays spaced 120 degrees, considerable overlapping was noticed. An antenna located in the northeast corner of U. S. A. can place an effective signal over the whole country. However, DX signals coming in on the center of a beam would frequently drop as much as five S units when a shift was made to another antenna 120 degrees away. Local signals for some reason did not show this great drop, probably because of the broad patterns in both vertical and horizontal planes.

Unidirectional System

Pleased with the results from this bidirectional system, it was decided to change over to a unidirectional array which would further increase the efficiency, since only one direction at any given time is of any value, of course. The *Handbook* says that a collinear array becomes unidirectional when a similar array is spaced a quarter wave behind it to act as a parasitic reflector. It was further noted that the addition of a parasitic element at a quarter-wave spacing would lower the impedance but slightly. Two of the original Lazy Hs were lowered and rearranged as shown in Fig. 2. A d.p.d.t. relay was mounted on a post halfway between the two arrays and connected in such a manner that it was possible to use either set of elements as the radiator, the disconnected elements always acting as the reflector as in Fig. 3. Care was taken to see that the lengths of feed lines from the vertical phasing section to the relay were both the same. This resulted in no change in load or tuning of the transmitter when changing directions. An unbalance in a number of feed lines can be a headache, particularly in contests where rapid changing of directions can pay off.

Needless to say, a definite difference was noted between the bidirectional array and the unidirectional system. The addition of the extra set of elements increased the forward gain from 3 to 4 db. and appeared to have lowered the vertical angle. Although no actual checks were made with a field-strength meter on the front-to-back ratio, numerous tests were made with stations which gave fairly accurate results, since it was possible to change direction instantly by merely throwing

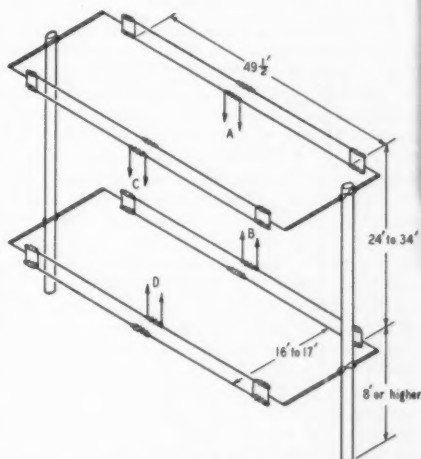


Fig. 2 — Dimensions of the Lazy H array. Feeder-switching connections are shown in Fig. 3.

the relay switch in the shack. The author has always been skeptical regarding tests made with outside stations with a rotary beam. Unless conditions are unusual, anything can happen by the time a beam has been rotated 180 degrees. On the average, a difference of $1\frac{1}{2}$ to $2\frac{1}{2}$ S units in strength was noted when reversing direction on local or loud signals, whereas on weak or distant stations a greater difference usually showed both on receiving and transmitting.

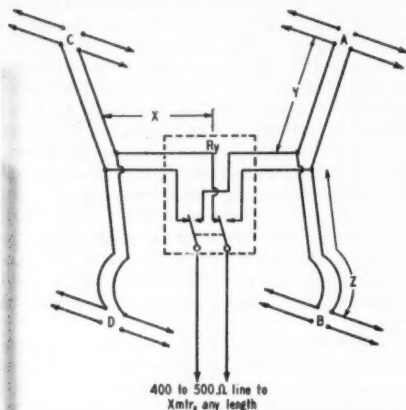


Fig. 3 — Feeder-switching system for changing direction with the Lazy H array. The distance X should be 2 to 5 ft., Y approximately 17 feet. The size of the take-up loop depends on the spacing between the upper and lower sections. Ry is a d.p.d.t. relay. All line spacing can be 3 to 6 inches. Lengths of similar sections should be kept equal.

Conclusions

In summarizing this antenna, we feel that it has a forward gain equal to, if not far greater than, a three-element rotary at the same height. It does not possess the horizontal receiving discrimination of the latter but, in turn, the broader vertical pattern of the stacked array has the advantage of consistent communication over a longer period of time. With the height possible at W2ICE, it was judged that the vertical pattern should peak somewhere between 25 and 30 degrees from the single Lazy H and at a much lower angle for the unidirectional array. However, this point may be open to question, since the array is located on the crest of a hill with a drop of approximately 60 feet at a 45-degree angle in one direction. This may have a tendency to make the vertical angle less than if it were on perfectly horizontal terrain. We strongly advise anyone erecting this array to try and have it as high as possible, not only to lower the vertical angle but also to clear surrounding objects. As an example, if 48-foot poles are available, try to have the lower section about 17 feet off the ground.

This will give 31-foot spacing without a loop, since the lines to the relay box will tend to pull the vertical sections inward, thus taking up the slack.

At no time were any of the dimensions found critical, the only caution necessary being to keep like sections somewhere near equal. With the dimensions given, the antenna will tune the entire 14-Mc. band without any tuning or cutting. Since the elements are folded, it was found to load practically flat over the entire band with little change with weather conditions. Mechanical details have not been discussed here, since everyone has his own ideas on the subject. Although ordinary No. 12 antenna wire may be used throughout, it was found that No. 10 aluminum wire could be bought at a local supply house for slightly more than regular wire, with the advantage that the aluminum is much easier to handle. I was able to cut some rough poles from a near-by patch of woods, so the supporting structure, while perhaps not too beautiful, was cheap enough.

With the beam pointed either NE or SW, it was possible over a few week ends of 14-Mc 'phone operation to work stations anywhere from North Africa to Sweden in one direction and from Central America to Australia in the opposite direction. All reports were flattering. Maybe it was the power or the location, but we like to think it was the antenna.

Strays



In recognition of the emergency-service value of amateur radio operators, Florida is issuing special license tags to ham automobile owners. Looking at one of the new plates is C. Ralph Dawson, W4HGO, and State Senator Lloyd F. Boyle, W4IMJ, sponsor of the legislation.

10-Meter WAS Contest

CONTEST PERIODS

Time	Start	End
	Jan. 8th and 13th	Jan. 8th and 15th
EST	6:00 P.M.	6:00 P.M.
CST	5:00 P.M.	5:00 P.M.
MST	4:00 P.M.	4:00 P.M.
PST	3:00 P.M.	3:00 P.M.

If you're a member of the ten-meter gang, here's an activity that was designed especially for you. Even if you're not a "regular" on the band, you'll want to join the fun! This contest will give you the opportunity to pit your skill against the best operators in your section and also give you the chance to get some of those states needed for WAS.

If you are located anywhere in the League's field-organization territory (see page 6, any QST), you are cordially invited to take part in this new operating activity. Contest reporting forms will be sent to all amateurs who request them by mail or radiogram but it is not necessary to use these forms if the sample form shown is followed. Total available operating time will be 96 hours. C.w. to c.w., 'phone to c.w./c.w. to 'phone, or 'phone to 'phone can be used. Tune up your gear now, oil the beam, cross your fingers

and hope for short skip, long skip and ground wave.

Rules

- 1) **Eligibility:** The contest is open to all radio amateurs in the sections listed on page 6 of this issue of QST.
- 2) **Time:** All contacts must be made during the contest periods listed elsewhere in this announcement.
- 3) **QSOs:** Contacts must include report received and sent, location of station worked.
- 4) **Scoring:** One point is allowed for each contact and one multiplier point for each new state worked. The same station may be worked but once during the contest for credit. The final score equals the total contact points multiplied by the total number of different states worked.
- 5) **Reporting:** Contest work must be reported as shown in the sample form. Closing date of entries is February 1, 1950.
- 6) **Awards:** A certificate will be given the highest scorer in each section.



25 Years Ago
this month

January, 1925

... Africa and Asia are the only continents unreported as "Super DX" QSOs become commonplace on 75 to 100 meters.

... "Calls Heard" has taken on a definite international flavor, with American and Canadian amateur signals being reported in England, France, Belgium, Italy, Spain, Sweden, Argentina, Australia and New Zealand.

... Outstanding low-power work on the new 40-, 20- and 5-meter amateur bands will be recognized by silver loving cups donated by J. C. Cooper of Atlanta, Ga., and by ARRL.

... A Second Governor-President Relay is announced by the Traffic Manager for March, to tie in with the inauguration of President-elect Coolidge.

... To meet the requirements of low-loss tuners for the short waves, coils with low distributed capacity and r.f. resistance are reviewed by the Hq. technical staff. John M. Clayton, 1DQ, presents a cylindrical self-supporting type; Technical Editor S. Kruse details a form-wound model with spaced turns; Department Editor L. W. Hatry reviews the electrical and mechanical characteristics of an ideal inductor.

... Technical Editor Kruse outlines the fine points of the low-loss neodymium c.w. tuner of Don Wallace, 9ZT.

... Amateurs and broadcast listeners have been asked by the *Scientific American* to cooperate as observers during the fading tests to be held in conjunction with the total eclipse of the sun on January 24th.

... Acting Secretary of Navy L. W. Eberle has thanked amateurs for their assistance in maintaining communication during the recent 'round-the-country' flight of the dirigible *Shenandoah*.

... Every district supervisor of radio was present at the Department of Commerce's Third National Radio Conference at Washington. Those attending were Messrs. R. Y. Cadmus, Third District; S. W. Edwards, Eighth District; W. D. Terrell, chief supervisor; Theo. G. Deiler, Fifth District; E. A. Beane, Ninth District; Oscar R. Redfern, Seventh District; Walter C. Van Nostrand, Fourth District; Charles C. Kolster, First District; Arthur Batcheller, Second District; and John F. Dillon, Sixth District.

... Improved circuits and mechanical arrangements for operating mercury-arc rectifiers are detailed by Earl D. Smith, 3PZ-3XO.

... "Making Your Own Bug" entitles an interesting how-to-build-it article by Ralph E. Kepler, 8OT; similarly, A. W. McAulay, 8CEO, gives the dope on a homebuilt primary filament rheostat.

10-METER WAS CONTEST REPORT

Station Location

Date and Time	Station	Report Sent	Report Received	Location	Number of Each New State as Worked
Jan. 6					
6:01 P.M.	W9MIR	57	58	Ill.	1
6:03	W5DEW	56	57	Texas	2
6:06	W5OQT	45	46	Okl.	3
6:10	W9ICW	58	59	Mo.	4
6:13	VE4AB	579	57	Man.	-
6:18	W9RBI	57	56	Wis.	5
6:21	W9YMF	58	599	Ill.	-
Jan. 7					
3:00 P.M.	W4NFY	57	57	Fla.	6
3:06	W6TT	59	59	Cal.	7
3:10	W9CFT	589	579	Wis.	-
3:13	W6AM	569	589	Cal.	-
3:17	KP4AB	59	59	P. R.	-

Number different stations worked: 12

Number different states worked: 7

Claimed score: 12 points \times 7 states = 84

I have observed all WAS Contest rules as well as all regulations established for amateur radio in my country. My report is correct and true to the best of my knowledge.

Signature

Address



Walkie-talkies, modified to the CMRC mobile frequency of 29.64 Mc. by W9LLX (shown), were a valuable adjunct to handling Shrine parade communications.

Chicagoland Ham Mobilers Serve as Communications First-Liners

MEMBERS of the Chicagoland Mobile Radio Club — 142 units strong at last tally — have in recent months turned in a series of successful communications efforts which should be inspiring examples for similar amateur groups throughout the land.

The initial trial of the Club's mobile communications net was the Navy-sponsored model airplane meet held at Glenview Naval Airbase, with 55,000 people in attendance. Working closely with the walkie-talkie operators of the Midwest V.H.F. Radio Club (p. 52, Oct., '49, *QST*), Chicagoland mobile units transported Naval observers and retrieved 52 model planes. The v.h.f. gang reported scores to the mobile units, and also relayed descriptions of planes which were drifting away from the field.

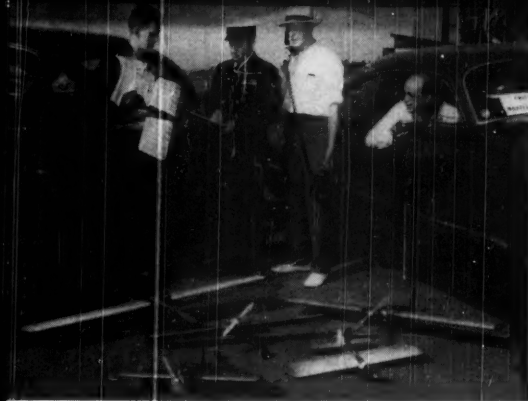
The big tests of the CMRC mobile circuits were two six-hour-long Shrine parades, held in Chicago on successive days. It is estimated that two million people lined the parade right-of-way from Erie Street to Soldiers Field, where an additional 90,000 spectators, including President Truman and his party, waited. Acting under the direction of the Parade Marshall and carrying Army officers, the CMRC mobile cars handled all traffic necessary to assembling, directing, and dispersing the huge processions. Sixty calls for ambulances were handled in routine fashion, as were several requests for police aid. All cars carried identifying placards, which took them through police lines. The parades were an iron test for the mobile units,

some cars traveling as many as 300 miles along the right-of-way, while others burned fifteen gallons of gasoline to keep their batteries charged.

With valuable lessons learned and rough spots polished off, the Chicagoland gang a few weeks later provided efficient communications for the Chicago *Sun-Times* model airplane meet at Franklin Airport. Here 20,000 spectators learned of the emergency communications potentialities of ham radio, as CMRC mobile units retrieved 27 models, including one which had drifted 28 miles from the field.

The activities of the club have been favorably reported by the press and radio. Of special note was the televising of club members on the WGN-TV Chicagoland Newsreel program conducted by Spencer Allen, W9JGL. Dr. W. S. Kelly, W9MDO, CMRC president, has received for the club numerous letters of commendation from military and civic leaders.

Chicagoland mobile units operate on 75-, 20- and 10-meter 'phone, and 40-meter c.w. All cars have modern noise-suppressing gear installed, and virtually all receivers have effective noise limiters. In many instances vehicles have provision for changing frequency or band from the driver's position. To cope with any emergency, 12 monitoring stations are maintained in the Chicago area to receive call-ins, day or night, on the Club's official frequency of 29.64 Mc. (Photos on these pages by "Chuck" Kelly and Brandt & Wright.)



The Navy, Midwest V.H.F. Club, Chicagoland Mobile Radio Club and photographer go into conference over the ownership of model aircraft at the Glenview meet.



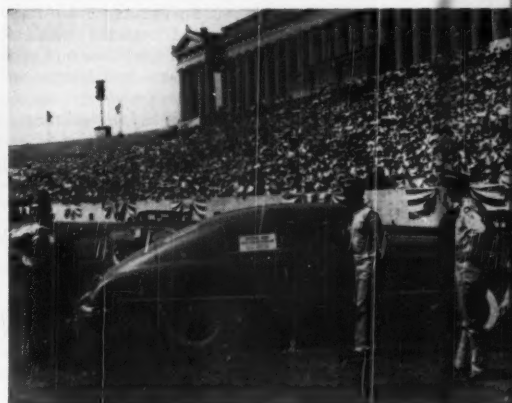
W9MDO/9 and W9JZN/9 operating at the Glenview Naval Airbase model aircraft meet. MDO is president of the Chicagoland Mobile Radio Club.



Meeting point before parades. L. to r.: W9MDO, W9LLX, W9GW, W9NLP, W9HLB, W9FCO, W9RSJ, an unidentified W4, W9MO, W9BEQ, and Army personnel under command of Maj. Houghton.



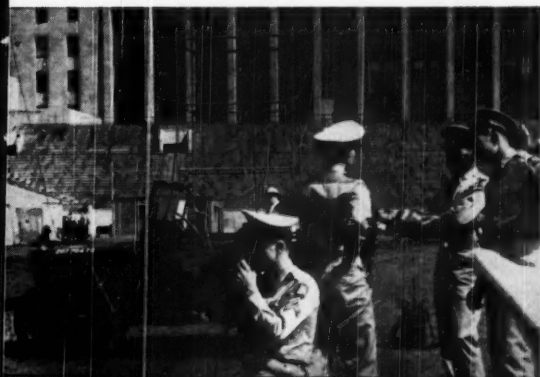
Three Army jeeps and 20 ambulances were on standby during the parades. They were dispatched by CMRC radio control cars.



W9MDO/9, located at Soldiers Field during both parades, acted as liaison with the Parade Marshall's car, with Army officers in charge of dispersal of parade units, and with ambulance and jeep dispatch.



Everywhere the Parade Marshall went CMRC hams went along too. W9KBO handled communications for the Marshall's car the first day, W9HLB the second.



Happenings of the Month

AMENDED F.C.C. PROPOSALS

The Federal Communications Commission on November 16th issued a further Notice of Proposed Rule Making which is reproduced on the adjoining pages. This document in effect washes out the earlier notice of last April and outlines what FCC now proposes to change in the amateur regulations. Comments may be filed by any interested party until January 16, 1950.

In most respects the Commission has adopted the recommendations of the informal engineering conference it sponsored on October 10th-11th, which in turn were adopted from the decisions made by the ARRL Board of Directors on October 8th. ARRL-conference recommendations are followed precisely as concern frequency assignments, telephony subbands, n.f.m. privileges, etc. FCC has discarded its earlier proposal for establishing 'phone bandwidth limitations. It has retained, contrary to conference recommendations, the principle of "hours of operation" and a statement of code speed as a condition to renewal; however, the new proposed language is such as to eliminate the primary objections earlier made by ARRL and the conference.

The Novice and Technician Classes, which received approval by the informal conference, are an integral part of the new proposals, to become available January 1, 1951 (the intervening time will be required, says FCC, to work out administrative details). But so is the Amateur Extra Class license, which was rejected by the conference; however, the League-conference objections had been primarily on the basis that the Extra Class license appeared simply a device to require eventual reexamination of present Class A operators, and the new language eliminates at least some of those objections. The Commission now proposes to write the rules so that holders of Class A privileges (under the new name of Advanced Class) can renew licenses so long as they can continue to meet renewal requirements; but after December 31, 1951, no new Advanced Class (Class A) licenses will be issued, and new applicants for "Class A" privileges will therefore have to obtain the Extra Class ticket, for which they become eligible after two years of license tenure, by passing an examination which includes a 20-w.p.m. code test and a more difficult written exam. Thus the effect will be to raise the examination requirements for the class of license conveying present maximum privileges, but providing a "grandfather" clause to protect those persons already licensed for such privileges. In addition

tion to the new name of Advanced Class to replace Class A, FCC proposes to apply the title of General Class to the present Class B ticket, and Conditional Class to the present Class C license.

The new language for § 12.0, Basis and Purpose, differs slightly from the draft ARRL presented to the informal conference as what it might consider acceptable; these differences may be ascertained by comparing the adjoining copy with that on page 27 of December *QST*.

These matters are now under discussion among the Board of Directors to determine what position the League will take on the new proposals.

BOARD MINUTES CORRECTION

An error has been discovered in the minutes of the special meeting of the ARRL Board of Directors, held on October 8th. After discussion and voting on the Technician Class license (paragraph 12, page 32, December *QST*) Director Harold C. Bird requested to be recorded as voting opposed but this request was inadvertently overlooked in preparing the minutes. Paragraph 12 should therefore read:

12) On motion of Mr. Collett, after discussion, VOTED to accept the proposal to amend § 12.23 as concerns the establishment of a Technician Class license for operation on frequencies above 220 Mc., but with a request to the Commission that such licenses carry distinctive call signs. Mr. Bird requested to be recorded as voting opposed.

DIRECTOR ELECTION RESULTS

As a result of autumn elections in seven ARRL divisions and Canada, three new directors and four new alternates have been chosen by the membership, to take office January 1st, while four present directors and two alternates were returned to office.

John H. Brabb, W8SPF, becomes director of the Great Lakes Division, having received 761 votes to 682 for the incumbent, Harold C. Bird, W8DPE. The new director is partner in the law firm of Brabb & Waltensperger and is well known to Great Lakes hams, having been their alternate director since 1946. W8SPF is a Lt. Commander, USNR, and has many years of ham background, having been first licensed in 1922 as 8CRW. In the race for alternate, Harold E. Stricker, W8WZ, won handily by receiving 863 votes to 582 for his opponent, George H. Goldstone, W8MGQ. A physician, "Doc" has been an assistant director and is currently SCM of Ohio. First licensed as 8WZ in 1919, he has DXCC, WAC, WBE, WAS, RCC, OTC, and his call is

well known to participants in traffic and contest activities.

Kenneth E. Hughes, W6CIS, was chosen as the new director of the Pacific Division (to replace William A. Ladley, W6RBQ, who was not a candidate) winning over his opponent, Harry Engwicht, W6HC, 711 votes to 511. Ken is chief radio operator for the California State Department of Agriculture market news service and has a good background of ARRL organizational experience, having been SCM of San Francisco and, as current alternate director, the representative of the Pacific Division at recent Board meetings. He is ORS, OO, and a member of the A-1 Operator Club. To succeed Hughes as alternate the Pacific Division, in close balloting, picked **C. Porter Evans, W6BF**, with 627 votes to 581 for Ronald G. Martin, W6ZF. OM Evans is an electronics engineer engaged in nuclear physics research for the Navy, is OBS and secretary of the Mission Trail Net.

The third new director is **Lamar Hill, W4BOL**, chosen by Southeastern Division members to succeed William C. Shelton, W4ASR, director since 1940. The tally:

Richard H. Alford, W4BOC.....	205 votes
Lamar Hill, W4BOL.....	269 votes
Anthony Litchauer, W4JQ.....	32 votes
William C. Shelton, W4ASR.....	211 votes

W4BOL is manager of the G. B. Hill Lumber Co., active on all amateur bands, licensed since 1931, and FAM, ORS, and OO.

William W. Butchart, VE6LQ, becomes the new alternate Canadian General Manager, nosing out the incumbent, VE3AZ:

William W. Butchart, VE6LQ.....	379 votes
Ronald J. Heiler, VE1KS.....	135 votes
Leonard W. Mitchell, VE3AZ.....	340 votes

OM Butchart is an architect and plant superintendent for the Edmonton public schools, ORS and a member of the A-1 Operator Club, a former SCM and currently an assistant director.

Alex Reid, VE2BE, remains Canadian General Manager by a vote of 577 to 289 for his opponent, Thomas Hunter, jr., VE3CP. **Goodwin L. Dosland, W0TSN**, was returned to the Board as director of the Dakota Division, 377 votes to 144 for Willard D. Nelson, W0YPN. **Victor Canfield, W5BSR**, was reelected director of the Delta Division, 250 votes to 135 for J. T. Hargis, W5AQF, and 221 for James W. Watkins, W4FLS. **Leonard Collett, W0DEA**, retained the directorship of the Midwest Division by a thumping majority, 764 to 192 for his opponent, Walter B. Jennings, W0YQA. **William P. Sides, W4AUP**, continues as alternate of the Southeastern Division, 406 votes to 307 for Alpheus Stakely, W4FKE, and **Henry W. Wickenhiser, W3KWA**, was returned as alternate of the Atlantic Division, 927 to 644 for Samuel J. Thackeray, W3IU.

Interest in ARRL elections continues high; in

those divisions electing directors, 57.2% of the eligible members used their ballots. The figures by divisions:

Atlantic *	38.9%
Dakota.....	68.0%
Delta.....	63.1%
Great Lakes.....	49.6%
Midwest.....	51.4%
Pacific.....	60.0%
Southeastern.....	60.8%
Canada.....	63.4%

* Alternate election only.

NOTICE OF SPECIAL ELECTION

To All Full Members of the American Radio Relay League Residing in the Roanoke Division:

A special election is about to be held in the Roanoke Division to choose an alternate director to fill the unexpired term of J. Frank Key, W4ZA. Nomination is by petition, which must reach the Headquarters by noon of January 20, 1950. Nominating petitions are hereby solicited. Ten or more Full Members of the Roanoke Division may join in nominating any eligible Full Member residing in the Division as a candidate for alternate director therefrom. Suggested form:

Executive Committee

The American Radio Relay League
West Hartford 7, Conn.

We, the undersigned Full Members of the ARRL residing in the Roanoke Division, hereby nominate.....
..... of as a candidate for
alternate director from this division for the unexpired remainder
of the 1949-1950 term.

(Signatures and addresses)

See the election notices appearing in August and September *QST* for additional details on standard election procedures and eligibility of candidates, or write the Headquarters for a copy of the Constitution and By-Laws; a copy will be sent to any member upon request. If on January 20th there is but one eligible nominee, he will be declared elected. If there is more than one nominee, ballots will be sent to Full Members of the division the first week in February. Members of the division are urged to take the initiative and file petitions promptly.

For the Board of Directors:
October 15, 1949

A. L. BUDLONG,
Secretary

VOICE OF AMERICA

Have you heard the Voice of America's weekly program devoted entirely to amateur radio? Prepared with the cooperation of ARRL, it is broadcast twice each Sunday on several frequencies beamed to various parts of the world.

The first airing of the 15-minute program, beamed to the Latin Americas and the Far East, is at 8:45 A.M. EST and is transmitted from various points in the United States on these frequencies: 6060, 6185, 9515, 9570, 9750 and

11,730 kc. The rebroadcast is beamed to Europe at 2:15 P.M. EST on 9690, 11,790, 15,250, 15,270, 17,780, 21,500 and 21,650 kc. Each of these programs is relayed either in the Far East or in Europe on various frequencies for additional coverage. We think you'll find them excellent listening.

EXAMINATION SCHEDULE

The Federal Communications Commission will give amateur examinations during the first half of 1950 on the following schedule. Remember this list when you need to know when and where examinations will occur. Where exact dates or places are not shown below, information may be obtained, as the date approaches, from the Engineer-in-Charge of the district. *Even stated dates are tentative and should be verified from the Engineer as the date approaches.* No examinations are given on legal holidays. All examinations begin promptly at 9 A.M. except as noted.

Albuquerque, N. M.: April 5.
Amarillo, Tex.: April 3.
Anchorage, Alaska, 53 P.O. & Courthouse: By appointment.
Atlanta, Ga., 411 Federal Annex: Tuesday & Friday at 8:30 A.M.
Bakersfield, Calif.: Some time in February.
Baltimore 2, Md., 508 Old Town Bank Bldg.: Monday through Friday. When code test required, at 8:30 A.M.
Bangor, Me.: Some time in April.
Beaumont, Tex., 329 P.O. Bldg.: Thursday and by appointment.
Billings, Mont.: April 29.
Birmingham, Ala.: Jan. 6 and April 7.
Bismarck, N. D.: April 12.
Boise, Idaho: Some time in April.
Boston, Mass., 1600 Customhouse: Monday through Friday, 8:30 A.M.
Buffalo, N. Y., 328 P.O. Bldg.: Thursday.
Butte, Mont.: April 27.
Charlestown, W. Va.: Some time in March and June.
Chicago, 246 U. S. Courthouse: Friday.
Cincinnati: Some time in Feb. and May.
Cleveland, Ohio: Some time in March and June.
Columbus, Ohio: Some time in Jan. and April.
Corpus Christi, Tex.: Mar. 16 and June 15.
Cumberland, Md.: April 20.
Dallas, Tex., 500 U. S. Terminal Annex Bldg.: Monday through Friday.
Davenport, Iowa: Some time in Jan. and April.
Denver, Colo., 521 New Customhouse: 1st and 2nd Thursdays and by appointment.
Des Moines, Iowa: Jan. 12 and April 6.
Detroit, Mich., 1029 Federal Bldg.: Wednesday and Friday.
El Paso, Tex.: April 7.
Ft. Wayne, Ind.: Some time in Feb. and May.
Fresno, Calif.: March 15 and June 14.
Grand Rapids, Mich.: Some time in Jan. and April.
Hartford, Conn.: Some time in March.
Hilo, T. H.: April 11.
Honolulu, T. H., 609 Stangenwald Bldg.: Monday, 8:00 A.M.
Houston, Tex., 324 U. S. Appraisers Stores Bldg.: Tues. and Fri.
Indianapolis, Ind.: Some time in Feb. and May.
Jacksonville, Fla.: April 8.
Juneau, Alaska, 6-7 Shattuck Bldg.: By appointment.
Kansas City, Mo., 3200 Fidelity Bldg.: Friday, 8:30 A.M.; also by appointment.
Klamath Falls, Ore.: Some time in May.
Knoxville, Tenn.: March 8 and June 7.
Las Vegas, Nev.: Some time in April.
Lihue, Kauai, T. H.: April 18.

Little Rock, Ark.: Jan. 18 and April 19.
Los Angeles, 539 U.S.P.O. & Courthouse Bldg.: Wednesday 9:00 A.M. and 1:00 P.M.
Memphis, Tenn.: Jan. 10 and April 11.
Miami, Fla., 312 Federal Bldg.: Monday and Thursday.
Milwaukee, Wis.: Some time in Jan. and April.
Mobile, Ala., 324 U. S. Courthouse and Customhouse: Wednesday and by appointment.
Nashville, Tenn.: Feb. 8 and May 10.
New Orleans, La., 400 Audubon Bldg.: Monday through Friday, except Monday through Wednesday at 8:30 A.M. when code test required.
New York, 748 Federal Bldg.: Monday through Friday.
Norfolk, Va., 402 Federal Bldg.: Monday through Friday, except Friday only when code test required.
Oklahoma City, Okla.: Jan. 19-20 and April 20-21.
Omaha, Nebr.: Jan. 19 and April 13.
Philadelphia, 1005 U. S. Customhouse: Monday through Friday.
Phoenix, Ariz.: Some time in April.
Pittsburgh: Some time in Feb. and May.
Portland, Me.: Some time in April.
Portland, Ore., 307 Fitzpatrick Bldg.: Friday, 8:30 A.M.
Reno, Nev.: April 19.
Roanoke, Va.: April 1.
St. Louis, Mo.: Feb. 9 and May 11.
St. Paul, Minn., 208 Uptown P.O. Bldg.: Friday.
Salt Lake City, Utah: Mar. 15 and June 14.
San Antonio, Tex.: Feb. 9 and May 18.
San Diego, 230 U. S. Customhouse: By appointment.
San Francisco, 323-A Customhouse: Monday and Friday, 8:45 A.M.; also, Class A Monday through Friday.
San Juan, P.R., 323 Federal Bldg.: Thursday; and Monday through Friday at 8:00 A.M. if no code test required.
Savannah, Ga., 214 P.O. Bldg.: By appointment.
Schenectady, N. Y.: Mar. 8-9 and June 7-8 (exams at 1:00 P.M. and 7:00 P.M.).
Seattle, 808 Federal Office Bldg.: Friday.
Sioux Falls, S. D.: Mar. 8 and June 14.
Spokane, Wash.: April 25.
Syracuse, N. Y.: Some time in Jan. and April.
Tampa, Fla., 410 P.O. Bldg.: By appointment.
Tucson, Ariz.: Some time in April.
Tulsa, Okla.: Jan. 23-24 and April 24-25.
Washington, D. C., 415 22nd St., N. W.: Monday through Friday, 8:30 A.M.
Wichita, Kans.: March 9.
Williamsport, Pa.: Some time in March and June.
Wilmington, N. C.: June 3.
Winston-Salem, N. C.: Feb. 4 and May 6.

In the Matter of
Amendment of Part 12
of the Commission's
Rules Governing
Amateur Radio Service

Docket No. 9295

Further Notice of Proposed Rule Making and Notice of Provisional Designation for Oral Argument

1. Notice is hereby given of further proposed rule-making in the above-entitled matter. Notice is also given that the above-entitled matter is hereby provisionally designated for general oral argument to be held in Washington, D.C., at a time to be later announced.

2. On April 21, 1949, the Commission released a Notice of Proposed Rule Making in this matter. Numerous comments were received with regard thereto from individual amateurs and amateur organizations. In addition, a request was received from the American Radio Relay League that the matter of the proposed rules be designated for oral argument "as a prerequisite to complete and proper resolution of the problems presented." On October 10 and 11, 1949, an informal conference between members of the Commission's staff and all interested parties was held in order to discuss the form and substance of the proposed rules. As a result of the comments referred to and the discussions which occurred at the informal conference, the Commission has concluded that it would be in the public

interest to modify the form and substance of the original proposals in this matter in a manner which is believed will be found to be generally acceptable to the amateur fraternity. However, in view of the request for oral argument heretofore made in this rule making proceeding by the American Radio Relay League, it is deemed appropriate to designate the matter of the proposals herein made for general oral argument unless it is clearly apparent from the comments filed on the proposals herein made that general oral argument is not desired by any interested parties.

3. The modified proposal is set forth in an appendix attached to this Notice. Authority to issue this proposal is contained in Sections 4(i) and 303(b)(c)(g)(l) and (r) of the Communications Act of 1934, as amended.

4. As above indicated the date for oral argument, if one is to be held, will be announced in a future notice. All interested parties may participate in such argument if and when it is held. In regard to the rules proposed herein interested parties may submit comments or briefs in writing until January 16, 1950. Such briefs or comments may be either in opposition to or in support of the rules proposed herein. An original and four copies of such briefs or comments shall be furnished the Commission.

Adopted: November 16, 1949

FEDERAL COMMUNICATIONS COMMISSION
T. J. SLOWIE, Secretary

APPENDIX

PART 12 — RULES GOVERNING AMATEUR RADIO SERVICE, is amended as follows:

A new section 12.0 is added to read as follows:

§ 12.0 Basis and Purpose. — These rules and regulations are designed to provide an Amateur Radio Service having a fundamental purpose as expressed by the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international good will.

Section 12.111(a) is amended in the following particulars:

1. Subparagraph (ii) of paragraph (8) is amended to read as follows:

(ii) 3800 to 4000 kc, using type A3 emission and, on frequencies 3800 to 3850 kc, using narrow band frequency or phase modulation for radiotelephony, to those stations located within the continental limits of the United States, the Territories of Alaska and Hawaii, Puerto Rico, the Virgin Islands and all United States possessions lying west of the Territory of Hawaii to 170° west longitude, subject to the further restriction that type A3 emission, or narrow band frequency or phase modulation for radiotelephony, may be used only by an amateur station which is licensed to an amateur operator holding an Amateur Extra Class or Advanced Class license and then only when operated and controlled by an amateur operator holding an Amateur Extra Class or Advanced Class license.

2. Paragraph (4) is amended to read as follows:

(4) 14000 to 14400 kc, using type A1 emission and, on frequencies 14200 to 14300 kc, type A3 emission and, on frequencies 14200 to 14250 kc, using narrow band frequency or phase modulation for radiotelephony, subject to the restriction that type A3 emission, or narrow band frequency or phase modulation for radiotelephony, may be used only by an amateur station which is licensed to an amateur operator holding an Amateur Extra Class or Advanced Class license and then only when operated and controlled by an amateur operator holding an Amateur Extra Class or Advanced Class license;

3. Paragraph (6) is amended to read as follows:

(6) 28.0 to 29.7 Mc, using type A1 emission and, on frequencies 28.5 to 29.7 Mc, using type A3 emission and narrow band frequency or phase modulation for radio-telephony and on frequencies 29.0 to 29.7, using special emission for frequency modulation (radiotelephone transmissions and radiotelegraph transmissions employing carrier shift or other frequency modulation techniques).

4. Paragraph (7) is amended to read as follows:

(7) 50.0 to 54.0 Mc, using types A1, A2, A3 and A4 emission and narrow band frequency or phase modulation for radiotelephony and, on frequencies 52.5 to 54.0 Mc, special emission for frequency modulation (radiotelephone transmissions and radio telegraph transmissions employing carrier shift or other frequency modulation techniques).

Section 12.114 is amended in the following particulars:

1. Paragraph (b) is deleted.

2. Paragraph (c) is amended to read as follows:

(c) The use of narrow band frequency or phase modulation is subject to the conditions that the band-width of the modulated carrier shall not exceed the band-width occupied by an amplitude-modulated carrier of the same audio characteristics, and that the purity and stability of such emissions shall be maintained in accordance with the requirements of § 12.133 of these rules.

A new section 12.20 is added to read as follows:

§ 12.20 Classes of Amateur Radio Operator Licenses.
Amateur Extra Class

Advanced Class (Previously Class A)

General Class (Previously Class B)

Conditional Class (Previously Class C)

Technician Class

Novice Class

¹ Footnote to Section 12.20

Amateur Extra Class. — This new class of operator license will become available to qualified applicants January 1, 1951.

Advanced Class. — This class of amateur operator license is the same as the Class A with change in name only. It (and the Class A) may be renewed as long as the holder to whom it was issued meets the renewal requirements current at the time renewal is applied for. New Advanced Class (or Class A) amateur operator licenses will not be issued after December 31, 1951.

Technician Class and Novice Class. — These classes of licenses are new and will become available to qualified applicants January 1, 1951.

Section 12.21 is amended to read as follows:

§ 12.21 Eligibility for License. — Persons are eligible to apply for the various classes of amateur operator licenses as follows:

Amateur Extra Class. — Any citizen of the United States who at any time prior to receipt of his application by the Commission has held for a period of two years or more a valid amateur operator license issued by the Federal Communications Commission, excluding licenses of the Novice and Technician Classes.

Advanced Class. — Any citizen of the United States who at any time prior to receipt of his application by the Commission has held, for a period of a year or more an amateur operator license issued by the Federal Communications Commission, excluding licenses of the Novice and Technician Classes. New Advanced Class amateur operator licenses will not be issued after December 31, 1951. However, valid Advanced Class (or Class A) licenses outstanding January 1, 1952 may be renewed as set forth in § 12.27.

General Class. — Any citizen of the United States.

Conditional Class. — Any citizen of the United States whose actual residence and amateur station location are more than 125 miles air line distant from the nearest location at which examinations are held at intervals of not more than 3 months for General Class amateur operator license; or who is shown by physician's certificate to be unable to appear for examination because of protracted disability; or who is shown by certificate of the commanding officer to be in the armed forces of the United States at an Army, Navy, Air Force or Coast Guard station and, for that reason

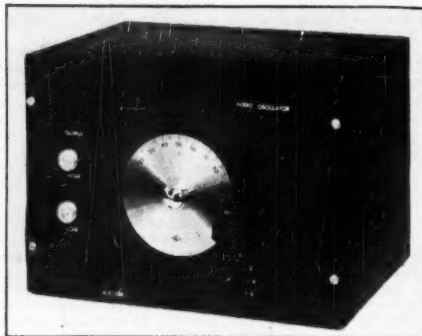
(Continued on page 108)

An RC-Type Audio Signal Generator

Its Construction, and a Calibration Process Using Lissajous Figures

BY RICHARD M. SMITH,* W1FTX

FOR HAM PURPOSES, an audio signal generator should meet the following requirements: (1) It should be possible to build the unit without expensive hard-to-get parts, and to do all of the work with the simple hand tools available in the average ham shack. (2) It should be tunable over that portion of the audio spectrum used either in actual ham communication or in testing gear built for ham communication—in other words, from about 30 to 15,000 cycles. (3) It must have nearly-constant output over its entire range, and that output must be sine wave. (4) The output voltage should be at least that required to simulate the output of the type of microphone used in ham equipment; i.e., a volt or so across either low- or high-impedance loads.



Front view of the audio signal generator. The entire unit, including power supply, is housed in an 8X10X7-inch cabinet. The output jacks, main tuning dial, power switch-volume control and range switch that permits output to be varied from 30 to over 18,000 cycles are arranged on the panel.

This may sound like a rather large order but in reality it is not difficult to meet all of these requirements in a unit that is both easy to build and light on the pocketbook. The circuit diagram, shown in Fig. 1, is certainly not complex, nor is the construction, shown in the photographs, difficult. In performance, the unit compares very favorably with commercially-built gear, and be-

cause readily-available parts are used, the cost is low.

The Circuit

The circuit uses triodes throughout. The two sections of a 6SN7GT are used as a resistance-capacitance oscillator and a 6J5 is used as a simple voltage amplifier to isolate the output terminals from the oscillator circuit and to deliver either high- or low-impedance output. As a matter of convenience, the power supply for the unit is constructed on the same chassis as the rest of the circuit.

The RC oscillator circuit¹ has become almost standard for use in audio oscillators, primarily because it has the advantage of providing good waveform and substantially-constant output over a wide range of frequencies, under widely varying conditions. The frequency of oscillation is determined by the network of resistors and the large variable condensers in the grid circuit of the first section of the 6SN7GT. The output is held constant by using an ordinary dial lamp, I_1 , as a regulating resistor. This lamp, along with wire-wound potentiometer R_{19} , constitutes a voltage divider that applies negative feed-back to the oscillatory circuit. The potentiometer is used to set the negative feed-back at a point where the circuit will just oscillate, because it is at this point that the waveform is best. The positive feed-back required to start and maintain the oscillation is supplied through the RC networks mentioned above.

Output from the oscillator is taken across the cathode resistor, R_{22} , of the second section of the 6SN7GT, and is applied, through a large capacity, C_5 , and the volume control, R_{24} , to the grid of the 6J5 voltage amplifier. The remainder of the 6J5 circuit is arranged so that output may be taken from the cathode circuit across R_{25} or from the plate circuit across R_{26} . Shorting-type output jacks are used so that when one output circuit is not in use it is suitably by-passed by either C_7 or C_8 .

The power-supply circuit is in no way unusual, although some pains were taken to insure good filtering and shielding to eliminate the danger of pick-up of 60-cycle hum by the oscillator and amplifier circuits. The slight additional work involved pays dividends because the hum content of the output is negligible.

* Technical Assistant, QST.

¹ For a complete discussion of RC oscillators see Terman, *Radio Engineering*, 3rd ed., p. 436.

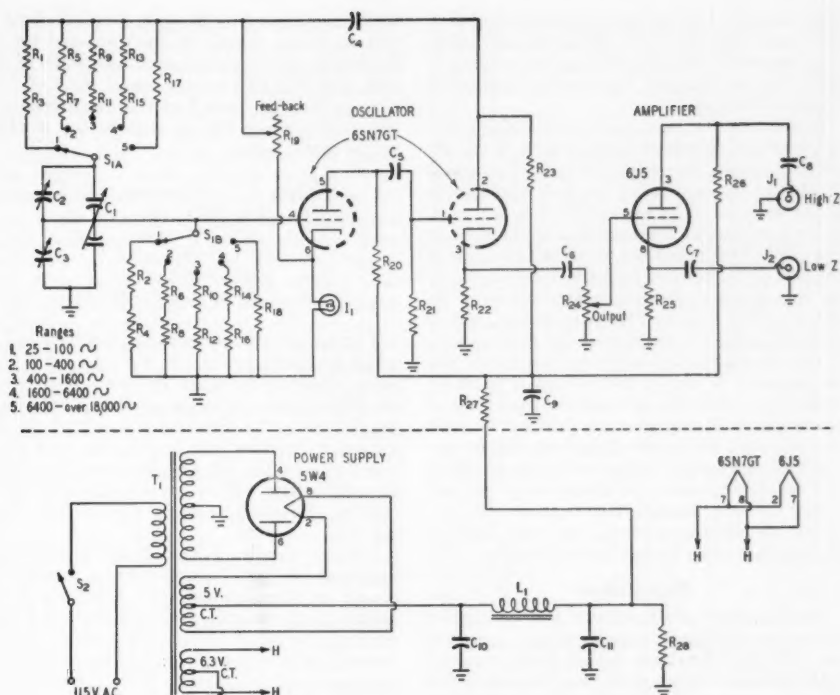


Fig. 1 — Schematic diagram of the audio signal generator.

C_1 — 450- μ fd. per-section dual variable.
 C_2, C_3 — 180- μ fd. compression trimmers.
 C_4, C_5 — 20- μ fd. 450-volt electrolytic.
 C_6 — 0.04- μ fd. 400-volt paper.
 C_7, C_8 — 50- μ fd. 25-volt electrolytic.
 C_9, C_{10} — 8- μ fd. 450-volt electrolytic.
 C_{11} — 16- μ fd. 450-volt electrolytic.
 R_1, R_2 — 8.2 megohms, $\frac{1}{2}$ watt.*
 R_3, R_4 — 1.5 megohms, $\frac{1}{2}$ watt.*
 R_5, R_6 — 2.2 megohms, $\frac{1}{2}$ watt.*
 R_7, R_8 — 0.22 megohm, $\frac{1}{2}$ watt.*
 R_9, R_{10} — 0.56 megohm, $\frac{1}{2}$ watt.*
 R_{11}, R_{12} — 0.1 megohm, $\frac{1}{2}$ watt.*
 R_{13}, R_{14} — 0.18 megohm, $\frac{1}{2}$ watt.*
 R_{15}, R_{16} — 22,000 ohms, $\frac{1}{2}$ watt.*
 R_{17}, R_{18} — 56,000 ohms, $\frac{1}{2}$ watt.*
 R_{19} — 5000-ohm wire-wound potentiometer.

R_{20} — 47,000 ohms, 1 watt.
 R_{21} — 1 megohm, $\frac{1}{2}$ watt.
 R_{22} — 1000 ohms, 1 watt.
 R_{23} — 22,000 ohms, 1 watt.
 R_{24} — 1-megohm potentiometer, audio taper.
 R_{25} — 1500 ohms, 1 watt.
 R_{26} — 56,000 ohms, 1 watt.
 R_{27} — 10,000 ohms, 1 watt.
 R_{28} — 60,000 ohms, 20 watts.

* Resistance tolerance $\approx 10\%$.
 L_1 — 9 hy., 50 ma. (Stancor C-1215).
 I_1 — 4-watt 115-volt lamp.
 J_1, J_2 — Shorting-type microphone jack (Amphenol 75-CL PC1M).
 S_1 — 2-section 2-pole 5-position ceramic.
 S_2 — S.p.s.t. snap switch (attached to R_{24}).
 T_1 — 325-0-325 v., 40 ma.; 5 v. c.t., 3 amp.; 6.3 v. c.t., 2 amp. (Stancor P-6010).

Construction

As shown in the photographs, the unit is housed in a standard steel cabinet which encloses a 7 \times 9 \times 2-inch chassis. The arrangement of most of the components is self-evident from the photographs.

The components of the power supply, with the exception of the bleeder resistor R_{28} , are mounted behind a shield partition that extends across the bottom of the entire chassis. Resistors R_1 through R_{18} , which are used in the frequency-determining

circuit, are mounted on the terminals of the ceramic range switch. Other parts are grouped about the tube sockets; their placement is not critical. All heater wiring, and the wiring to the a.c. switch on the back of the volume control, as well as the leads to the potentiometer itself, is made with shielded wire to reduce the chances of hum pick-up.

Good insulation is required in mounting both the main tuning condenser and the other components of the RC networks in the grid circuit.

This keeps the leakage resistance to ground high and avoids subsequent changes in the calibration. Using a ceramic switch for S_1 and ceramic button insulators to support the tuning condenser should do the job.

About the only tricky part in the wiring is the fitting of the numerous resistors used in the RC network across the switch contacts. The actual resistance values required are not available in single units so series-connected pairs are used. A few words about these resistors are in order at this point. It is important that the resistance in one arm of the network be made equal to that in the opposite arm. For example, the sum of R_1 and R_3 must equal the sum of R_2 and R_4 , and so on for all of the five positions of the range switch. If you cannot get close-tolerance resistors it will be necessary to match the individual pairs by measuring a number of resistors until two of nearly identical resistance are obtained for each pair required. We merely picked resistors at random from a supply of 10 per cent tolerance units, and found it necessary to change only one pair before we were through. Don't mount these resistors too securely at first; you may have to change them when you calibrate the unit.

Adjustment

The problem of adjustment and calibration consists of the following major steps: (1) getting the unit to oscillate over the full tuning range of each position of the range switch, (2) getting the unit to oscillate as described in (1) above without having to readjust the feed-back potentiometer when changing from one range to another, (3) setting the low-frequency limit of the oscillator, (4) adjusting the tuning "overlap" between ranges to produce the greatest possible frequency coverage, (5) actual calibration.

Steps 1 and 2 above are important in insuring smooth operation and good waveform, and must be performed, in the order named, before you tackle the remaining portion of the calibration job. The equipment needed to perform Steps 1 and 2 is nothing more elaborate than a pair of headphones, but an oscilloscope, a small filament transformer, and a receiver capable of tuning to

WWV are needed for Steps 3, 4 and 5. Even if you can't beg, borrow or steal a 'scope for an evening or two to get an *exact* calibration of the unit, you will still have a useful piece of gear after performing Steps 1 and 2, because the actual tuning range will be close to the nominal ranges shown below:

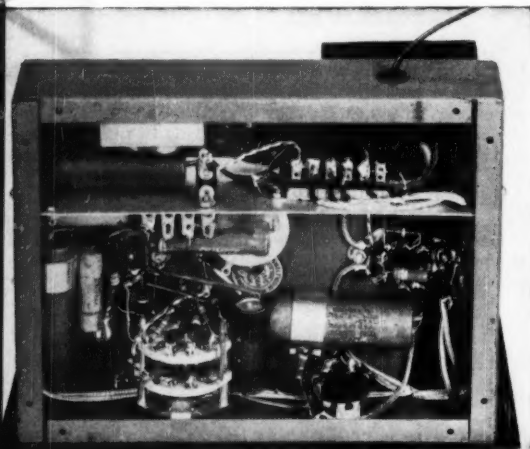
Range	Frequency
1	25 to 100 cycles
2	100 to 400 cycles
3	400 to 1600 cycles
4	1600 to 6400 cycles
5	6400 to over 18,000 cycles

You can get a rough calibration of Ranges 1, 2 and 3 by direct comparison with the notes on a piano. Charts showing the frequency of the various notes on the piano are available,² and it is a simple matter to zero-beat the output of the generator (working into headphones or a small 'speaker) with the notes of the piano. The use of the oscilloscope will be found to be more satisfactory, however, especially for the high range.

Connect a pair of headphones to the high-impedance output jack through a microphone connector (the shorting-type jack has to be opened by the microphone connector) and turn the range switch to Position 3. Set the volume control about halfway open. Set the main tuning condenser and trimmers C_2 and C_3 at maximum capacity. If a tone is not heard when power is applied, turn the feed-back potentiometer, R_{19} . Set this control at the point where oscillation just starts. Failure to oscillate regardless of the adjustment of R_{19} can be caused by capacity unbalance, or by "mismatch" in the resistors in the RC network — probably the latter.

Once oscillation is established, turn the main tuning condenser over its range to be sure that oscillation will be sustained throughout the range. If it quits part way through, it is because of unbalance in the tuning capacitance, and readjustment of either C_2 or C_3 should rectify the condition.

² *The Radio Amateur's Handbook*, 1949 ed., p. 548.



Bottom view of the audio signal generator. The power-supply components are separated from the rest of the circuit by a shield partition running across the full width of the $7 \times 9 \times 2$ -inch chassis. The ceramic range switch which supports the resistors used in the RC networks is mounted to the left of center on the front, with the combined a.c. switch and volume control on the right. The 4-watt lamp used to regulate output voltage of the oscillator can be seen just to the left of the range switch, where it is supported by the terminals of the oscillator tube socket.

Part 2 of the adjustment process is also simple. If you find that a different setting of the feed-back potentiometer is required when changing from one range to another, the difficulty is probably caused by unbalance in the resistance values in the RC network. The greater the unbalance, the less negative feed-back the oscillator can stand. Thus, determine which of the five ranges shows unbalance by setting the potentiometer at the point where oscillation is just barely sustained in one range, turn the range switch to another range, and see if more, or less, feed-back can be used. Find, in this manner, which range is your best; i.e., which range has the best match of its resistances, and then strive to make the other ranges as well balanced. This can be done by selecting resistors, if a good supply is available, but should not be necessary if 10 per cent (or closer) tolerance units were used in the first place. It should be possible to arrive at a condition where the "critical" setting of the feed-back potentiometer is about the same for all positions of the range switch.

To observe the waveform, you'll need that 'scope we mentioned earlier, but if you can't get one, you can rely, to a certain extent, upon your ears to tell you if any harmonic distortion is present. If it is, you'll hear what seems to be a complex tone, with a little fuzz on it, instead of the pure, piercing tone of a sine wave. If distortion is present, readjustment of R_{19} is called for.

In actual use it is possible to get as much as 50 volts undistorted output across a 10,000-ohm load from the high-impedance output terminal, and several volts across a 1000-ohm load from the low-impedance jack. In cases where an extremely low-impedance load is used, such as the primary of a microphone transformer, the output voltage falls somewhat below a volt. This difficulty can be overcome by using another similar transformer as a step-down device from the high-impedance output terminal. As much as 20 volts across a 100-ohm load can be obtained in this manner.

Calibration

If you live in an area where reliable 115-volt a.c. power is available, and where you can get a good signal from WWV on your receiver, you are already equipped with the best in the way of standards to use in the calibration. For most ham purposes the dial shown will be entirely satisfactory, but if precision work is contemplated, a more expensive unit may be used.

The calibration process requires the use of an oscilloscope on which you can compare the output of the oscillator and a voltage from the known frequencies supplied by the available standards, which are the 440- and 4000-cycle tones transmitted from WWV, and the frequency of the line voltage supplied by your power company (in most cases 60 cycles). The comparison of the two audio voltages is accomplished by

connecting the output of the unit to the vertical amplifier of the 'scope, and applying the voltage from the frequency standard to the horizontal amplifier. The images which result are called Lissajous figures, and may be used to determine accurately the ratio between the unknown frequency and the standard. For example, the pattern that results from placing a 60-cycle signal on the horizontal plates and a 120-cycle signal on the vertical plates is a figure 8 on its side, as shown in Fig. 2B.³ To put a 60-cycle signal on the horizontal plates, connect the secondary of a small filament transformer between the horizontal input terminal of the 'scope and ground, applying 115 volts a.c. to the primary. With the output of the audio generator connected to the

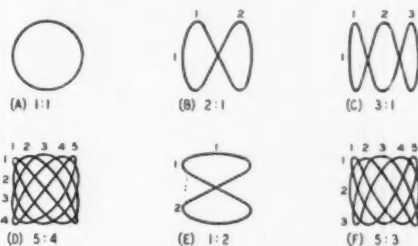


Fig. 2 — Some examples of the Lissajous figures that are used in calibrating the unit. Their interpretation is discussed in the text. Other patterns encountered in the calibration are displayed in Fig. 3.

vertical input terminals of the 'scope, set the range switch to Position 2 and turn the main tuning dial until the horizontal figure 8 appears on the screen. Note that as you approach the correct dial setting, the pattern will be revolving rapidly, gradually slowing down until, at one setting, the pattern will stand still. If you continue tuning past this point, the pattern will start to revolve in the opposite direction. Thus you can tell whether you are on the high- or low-frequency side of the correct setting. If the figure 8 seems to be elongated in one axis or the other, it is because you have the gain of one amplifier of the 'scope set too high. If one portion of the figure 8 seems flattened, distortion is present in either the output of the audio generator or in the signal being obtained from the standard. Needless to say, you should suspect your generator of being at fault before you accuse the power company of delivering lopsided waveform! Readjustment of feed-back potentiometer R_{19} may be required.

It will pay you to play around with the combination you now have to familiarize yourself

³ The patterns shown here are those produced when a 90° phase relationship exists between the two voltages. They are easier to recognize than the patterns produced for other phase relationships. See *Electrical Engineer's Handbook*, Pender and Mellwain, 3rd ed., p. 10-07; also *Modern Oscilloscopes and Their Uses*, Rinter, p. 137.

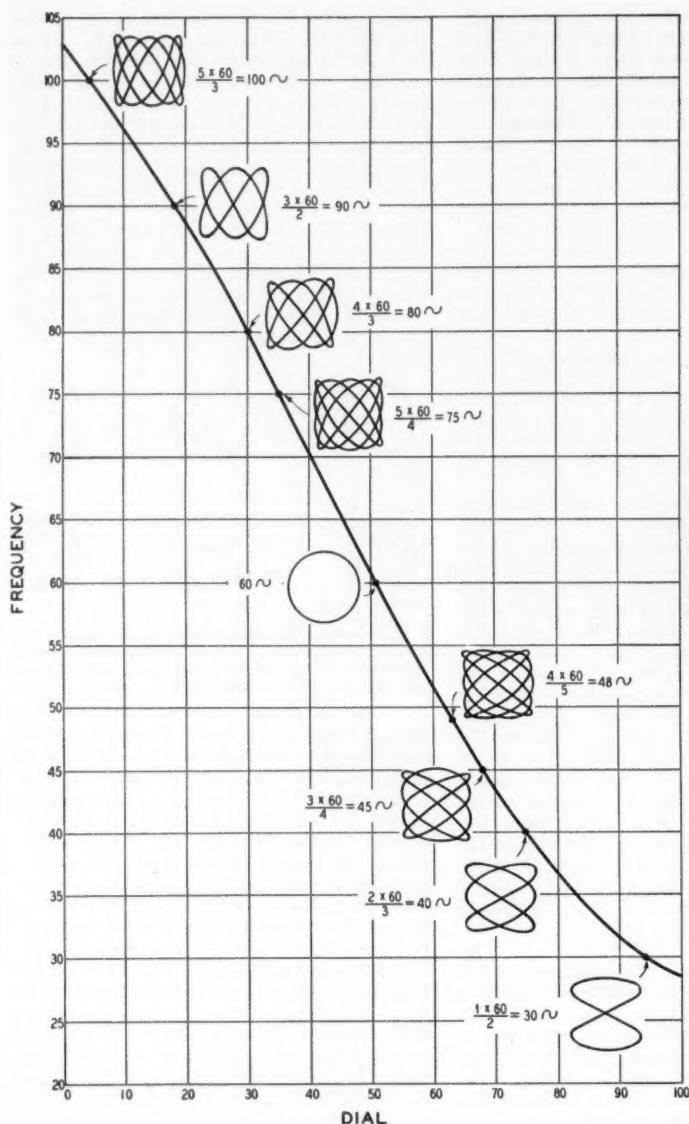


Fig. 3—A sample calibration curve for the audio signal generator. The Lissajous figures obtained for each of the points plotted on the graph are shown, as well as the actual computation derived from the pattern. The graph shown is for the lowest range. Others will be similar in appearance and derivation.

with other Lissajous figures a bit before proceeding with the actual calibration. With a little practice you will find that you are soon able to recognize the various patterns almost immediately. Examples of some of the combinations to be encountered are shown in Figs. 2 and 3. To take one particular case and follow it through, look

at Fig. 2C. This represents a frequency ratio of 3:1. In other words, the frequency of the unknown signal is 3 times that of the standard. Note that there are 3 peaks intersecting the horizontal axis, and just one gradual curve across the vertical. The pattern for a 4:1 ratio is similar, except that there are four peaks instead of three. In both

cases described above, note that the frequency of the unknown is *greater* than that of the standard. In cases where it is *less* than that of the standard, the larger number of peaks will be on the vertical axis, as in Fig. 2E. More complex ratios are also possible. For example, see Fig. 2D. This is the pattern obtained for a 5:4 ratio.

By simple arithmetic the frequency of the unknown is found as follows:

$$F = \frac{NS}{N_1}$$

where N = the number of peaks on the horizontal axis, S = the known frequency (60 cycles), and N_1 = the number of peaks on the vertical axis.

Thus:

$$F = \frac{5 \times 60}{4} = 75 \text{ cycles.}$$

In cases where a standard other than 60 cycles is used, S is changed to agree with the standard (440 or 4000 in the case of WWV, 50 in areas where 50-cycle power is used).

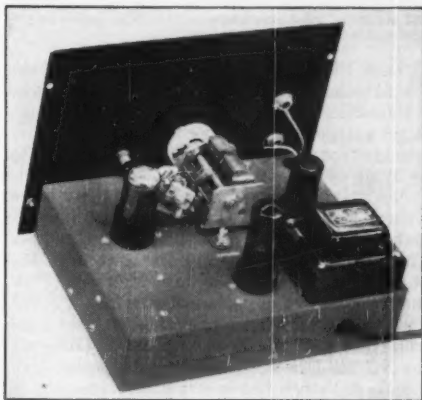
You are now ready to proceed with Step 3 of the procedure, setting the low-frequency limit of the generator. Turn the range switch to Position 1, and with the 60-cycle standard frequency applied to the horizontal plates of the 'scope, turn the dial on the generator toward maximum capacity until you get a pattern that looks like a figure 8 (Fig. 2E), indicating a ratio of 1:2, the pattern for 30 cycles. If you can't reach 30 cycles add resistance to each of the two arms of the RC network used for the low-frequency range. The initial resistance in this case is 9.7 megohms (R_1 plus R_3) and it takes a fairly large additional resistance to lower the frequency more than 5 or 10 cycles. Add about a half megohm at a time to each branch, remembering that the added resistors must also be "matched." By trial you can soon find the value that will permit the oscillator to be tuned to 30 cycles (or a trifle less) at maximum capacity.

Once the low-frequency limit of the oscillator is set, determine the actual tuning range with the switch set at Position 1. Depending upon the tuning condenser used and the stray capacities, you will be able to cover a $3\frac{1}{2}$ - or 4-to-1 frequency range. In the unit shown here the low range covers from about 28 cycles to 102 cycles, which is a bit better than 3.6 to 1. Once you know your tuning ratio, you can decide on the approximate amount of overlap that you can tolerate. The overlap between the other ranges is adjusted by the same means, but in each succeeding case the amount you change the resistance will be less.

When you start working into the ranges above 400 cycles, it will be advantageous to use the 440-cycle tone from WWV as the standard frequency. This voltage can be taken directly from the 'phone jack in your receiver; if the signal is

good you should have no trouble in recognizing the Lissajous patterns. For frequencies above 2000 cycles use the 4000-cycle tone on the WWV higher-frequency transmitters, tuning the receiver to the point where the 4000-cycle tone sounds louder than the 440-cycle tone.

Once the proper overlap between ranges has been established you can proceed with complete calibration of the individual ranges. Calibrate the low-frequency range first because the 60-cycle



Rear view of the audio signal generator. The 6SN7GT oscillator tube is at the left, the 6J5 voltage amplifier on the right, and the 5W4 rectifier in the center near the power transformer. The main tuning condenser and the ceramic trimmers are visible in the center. The feed-back control is mounted so that its shaft can be reached from the top, immediately behind the tuning condenser.

standard will be less apt to be obscured by noise than a signal taken off the air. Fig. 3 is a sample calibration curve prepared for the equipment described here. Note that the points plotted are at 30, 40, 45, 48, 60, 75, 80, 90 and 100 cycles. Other points in the range also will produce Lissajous patterns, but those shown are the simplest and therefore easiest to use.

Once the low-frequency range is calibrated the curve connecting the plotted points should be smooth, like the one illustrated. If one or two points don't fall where the general shape of the curve indicates that they should, the Lissajous pattern for those particular points should be reexamined.

Calibration of the higher ranges is carried out in exactly the same manner, using the 440- and 4000-cycle standards. The curve for each range should resemble the first because the shape is almost entirely dependent upon the construction of the tuning condenser.

On the Air with SINGLE SIDEBAND

The purpose of this column is to report schedules and operating times of active single-sideband stations, describe operating experiences and sometimes the gear in use, and possibly discuss some of the practical operating problems and suggested solutions. Contributions from active single-sideband stations will be welcomed.

ALL of the new ones this month are east of the Mississippi, which makes us wonder if there is something about the west that makes it tough to get a single-sideband rig going out there. After a sudden spurt at the start, the activity seems to be dying off.

Not so in the east. After mentioning that there were no W8s on the air with the stuff, we immediately got word from **W8ORD** that it wasn't so. To clinch it still more, Bob Mathews, **W8CJG**, of Salem, Ohio, checks in with his report. The exciter is on 75 and patterned after the **W2UNJ** phasing unit, driving a pair of 4-250As at anywhere from 250 to 800 watts peak. A **YRS-1** on the **NC-240-D** receiver helps out on receiving, so it looks as though Bob is taking full advantage of single-sideband techniques. He says, "I got as big a thrill working single sideband as I did hearing my first radio signal (**NAA**) in 1916, using a crystal detector and an antenna loading coil."

Carl Thrasher, **W2SAS**, is on 75 in Farmington, N. J., with a **W2UNJ** exciter driving an 829B to 125 watts on peaks. His letter merits almost a complete quote, we think: "... Needless to say, I am enjoying s.s.b. and believe a.m. is out for me from here on in. My 450THs are stone cold and will remain so if the results thus far on s.s.b. continue to be so good. Have had the usual trouble with frequency shift, overdrive, etc., but nothing to it — those things are easier to whip with s.s.b. than on a.m., especially with the help of a swell bunch of s.s.b. men like **W3ASW**, **W2UNJ**, **W2NJR**, **W1FAJ**, **W2SHN**, **W1SHN**, **W3BOL** and others."

That **W3BOL** mentioned above is Harry Hackerty of Bethlehem, Penna. He uses a filter rig à la **W0MNN**, ending up in a Class A 807 that drives a pair of 4-125s. With 1500 volts on the plates, the peak input runs around 300 watts, but the new power supply should permit about 700 watts. Usual frequencies are 3999 and 3895 kc. About a.s.b. Hack says, "I do not recall when I have built a piece of radio equipment with which I had so much pleasure and head scratching in getting into operation."

Another new one along similar lines is the filter rig at **W3QCM**, Bill Huston at Philadelphia.

He built his 20-kc. sideband filter from cores that **W3BOL** found in a junk yard, with a junk-box collection of miniature and octal tubes and a few ideas from the **W0TQK** article. The rig ends up on 75 with a pair of 811s running 350 watts on peaks.

The dope on **VE2SA**, Gordon Waugh of Verdun, is that a 75-meter phasing job is used, patterned after that of **W6CEM** but with 6L6s substituted for the 4-65As. He can get about 50 watts into it on peaks, and usually drives a pair of 813s to about 400 watts peak. He first got on the air on April 12, 1949, and the first two-way s.s.b. **VE QSO** was with **VE2VV** on April 16th. Plagued with **BCI** trouble, Gordon generally raises stations on n.f.m. and then switches to s.s.b. for a short test. His experience has been that the **BCI** with s.s.b. runs about the same as with a.m., with the only saving grace the fact that it is more difficult to identify! We would expect the **BCI** to be about the same or slightly less with s.s.b., depending upon circumstances, but so different in nature that it would be hard to assess its effect on the **BCL**. It looks like we need more experience along these lines. Ahem — any volunteers? **VE2SA** is moving to a better location (less chance of **BCI**) so he will be unable to continue his **BCI** tests but will have more time for s.s.b.

W1GR has hopped up his rig and now runs 600 watts peak to a pair of 304TLs on either 75 or 20. **DX** there is **DL4PA** and **KH6OZ**, both raised on s.s.b. The **KH6** said he was amazed to hear a **W1** coming right through the **S9 W6s**. **Al** says the activity is increasing rapidly on both 3.9 and 14 Mc., and it's getting so he hears a new s.s.b. station almost every evening. Actually that's no exaggeration, if you change it to read "every other evening."

W2LKN, Jack Heidt of Elizabeth, N. J., is on 20 with a phasing rig patterned after the "basic exciter" of a year ago. He is running about 75 watts to a pair of **TZ20s** and has worked out to the West Coast and **W9BVU**. He hangs out around 14,220 or 14,270 kc. evenings and week ends, and so far has found that not too many of the 20-meter 'phone gang seem acquainted with s.s.b. Give Jack a shout and get him to change his opinion.

Shy of **W4OLL** has now built three rigs all told, two phasing and one filter, and says he prefers the filter job by a wide margin, because it isn't as troublesome. We imagine the discussion will continue for a long time, and we aren't taking sides at this time, not having decided yet whether one gets out better with a Hartley or a Colpitts. (Remember that one?) Shy also mentions one thing we'll pass on that isn't opinion, however, so it won't start any argument. He says, "By the way, these guys who speak of complexity in single-sideband rigs please take note. Just counted

(Continued on page 114)

How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

How:

Just about now the antennae many W/VEs erected so hurriedly "before the cold sets in" are beginning to sag and snap in fine style. Numbers of neighbors are doubtless peering askance through frosty windows at muffled individuals seen high on roofs fumbling No. 14 splices with benumbed fingers. But perhaps they'll never understand. Neither will you lucky guys permanently situated in tropical climes!

Or could be we should be philosophical about the whole thing and adopt the viewpoint of the W7 who says, "Gosh, I like to fuss with skywires this time of year 'cause it feels so good to get back inside the shack again."

Reckon he wouldn't talk like that if he were a W9, though. Jeeves still can't get over the fact that here in the midwest a 40-meter folded dipole becomes a 20-meter job in the wintertime.

Digressing from matters VES and KC4, however, let us indulge in a timely plea directed toward DX stations employing A3 emission. In the interests of lowering the prodigious QRM level caused by fruitless and inopportune calling of DX by W/VEs on the 'phone bands, it is extremely important that DX consistently indicate their tuning procedure when seeking answers to CQs and voice equivalents of "QRZ?". The recommended c.w. procedure as in CQ DX 75U DE VK9ML 75U K may be paralleled orally by "Answer 75 kilocycles up from my frequency, go ahead" when modulating. Or, at the least, a fairly specific indication of the band segment about to be immediately tuned should be given.

As W2TXB writes to point out, all this becomes doubly important during contest periods when activity is at peak. All DX operators are urged to bear these points in mind during the coming 16th ARRL DX Competition.

Still on the subject of A3, a few months ago we inadvertently gave the impression that there was something underhanded about submitting 'phone-to-c.w. cards for 'phone DXCC credit, and a few laid us out in luscious lavender for the thing. We hasten to correct the imprint. The facts of life being what they are, the DXCC rules require only that the submitted card show that the applicant was using 'phone at the time, and this leaves the door wide open, of course. The rule was made this way because no one so far has been able to devise a foolproof method for check-

ing cards to show whether the confirmation is for a pure 'phone-to-'phone QSO or the maligned half-breed contact. The Century Clubbers who utilize these latter to pyramid their 'phone totals are only taking honest advantage of the rules, and there should be no stigma attached to their work.

Now perchance the following gleanings may be used to set your sights for a new one or two. Give, Jeeves. . .

What:

Eighty is still propagatin', according to KP4HU. Mac's 40-watter caught up with MD2GO (3520 t6), FA9RZ (VFO), LU3EL (3512) and several ZS-men, while KH6PL (3510) was heard. He further adds that MD7DC and HA4SA will hit 3.5 Mc., the latter with a new 300-watt outfit. . . . MD2GO gave W4BRB his 63rd 80-meter country. . . . Asia showed up on 80 in early December in the form of TA3GVU (3505). Fred made almost a dozen East Coasters happy the first night.

Forty is always worth a peek this time of year. Mediterranean-area operators like the band evidently, as W1AQT dug up ZB1AJX (7040) and KP4HU scored with MD7DC (7045). . . . W1QMJ bumped into such as EA6AF, EA8BC, I1NU/Trieste, KG4AK, EK1AO, SV8WH, GC2CNC, YO3RI, VP6WF and T12BF while W9ANT captured HR2HZ (7080), among others.

Receipt of the first KZ5 DXCC diploma hopped KZ5IP up to the tune of AP2N (14,128), MP4BAD (14,020 47), KB6AJ (14,043), MD7MR (14,000 t8), HE1EU (14,020) and VU2RX (14,020) on twenty and W8SYC hooked VQ8AB who told him he was leaving to put VQ8CB (14,100) on the air in the Chagos. Clint also tallied HS1SS (14,140). . . . MP4BAL (14,099), who is also W6PBV, passed a pleasant visit with VQ4ERR before heading for Bahrain to fire up his 6V6-807 rig. Bob desires all cards via the listed address and none to his Arabian QTH. . . . Rather pancaked by the



* DX Editor, QST. Please mail reports of DX activity to W9BRD's home QTH: 1517 Fargo Ave., Chicago 26, Ill.



VK9s NR and RH on the scene at Norfolk Island. VK9RH, ex-ZL2FP, is now active on 7-Mc. c.w. with intentions of joining the brawl on 14 Mc.

bedlam surrounding FY8AA (14,004), W2WZ still felt up to chatting with FESAB (14,053), LXIAS (14,035), PK2ZZ (14,002), EA6EG (14,034), MD2PJ (14,001), MD4GC (14,118), MD7DC (14,076), MP4BA (14,111), KR6AS (14,030), STZTC (14,008), SV7AA (14,018), SP5AC (14,045), CR9AG (14,060), W9BRD (14,032) [Lower Slobovia, eh Boss?—Jeeves], ZD3D (14,050 t8), ZB2I (14,061), ZS6OS/ZS7 (14,052), XZ2FK (14,096), 4X4AU (14,014 t7), 4X4CJ (14,050), VS6AC (14,059), VK1VU (14,092) and FN8AD (14,106). Al is still half an element shy of a 3-element rotary and we'll bet he leaves it as it is! W4CEN schedules ZD4AM and has it that the latter is seeking VP fellers on the band's low edge W8s UOX and PNQ are hot after ZD8B (14,023) who is popping through around 0100 local time Boy, everything happened to W4CYY and all at once. JB salted down his 100th-country confirmation, got married, and found his location newly incorporated inside the widening city limits of Belmont, N. C. This didn't keep the Owl from getting in telling blows on PK6XG, CR4AF, AP2Y, FY8UD and ZD6DH, however We are hearing of many casualties in the rotary-beam department of late, mostly due to the elements being battered by the elements. But W6ZZ's trouble is in the rotor division, leaving him with a fixed array. Miles is still getting his share, however, including his 120th, 4X4RE (14,009), EA8BC (14,027), CTIAS (14,037) and VS6BO (14,080) W6ALQ hoisted anchor for a new QTH (within DXCC distance, fortunately), trying it out on ZE2KY, VR2BH and CR7BN while W6EYR ran across EA6AF, UL7AB, 4X4CZ and was among the fortunate to pick off FN8AD one crisp morn.

The 'phone situation isn't slack what with VT1RF (14,165) in Kuwait as reported by VK7AZ, through HC2JR, giving the gang a tumble. HC2JR also reports as active ZK2AA (14,348), VR3A (14,131), CR5UP (14,186), FO8AD (14,181) and 4X4AD (14,339) ZS8A, usually found on ten, hits twenty every Saturday night on about 14,310 kc., mentions W5JUF. John also notes a consistent signal from VU2MA along the southern route plus contacts with VQ8AX, V878N, VU2CQ, VQ4s AC and NSH W2WZ found the n.f.m. still good for JA2EJ, DU1s AP (14,230) and WP (14,330) The birds took off from W4BPD's rhombics because of VR4AC (14,200), VR3C (14,245) and PZ1QM (14,070).

If the TV Le chop half your 14-Mc. beam down it's a cinch to work on ten. Results on 'phone at W2VRE were gratifying: LXIAI (28,486), FF8PG (28,394), MD2AC (28,290), M13SC (28,492), YO7WL (28,144), ZC6DZ (28,444), ZD1PW (28,186) and ZS3O (28,438) W1EUKU completed his ZS-district collection with Z89F and ZS6OS/ZS7 (QSL to home QTH) and found available

interesting items like MF2AA, HZ1AB, HE1HY, MP4BAE, F9QU/FMS, FF8FP, ZD1s FB, PW, SV0WH and HA5BC VQ4HJP interrupted a QSO with W9ARH in order to chase a giraffe out of the front yard and quiet down the dogs. Bob also added VQ5ALT, FESAB and KH6VX/KB6 (QSL % CAA, Canton Island) Found active by HC2JR were CR9AG (28,250), ET3AF (28,343), PK5HL (28,240), TF3SF (28,400), W2EJV/PK3 (28,410), ZD2S (28,180), ZK1BZ (28,553), ZS3Z (28,294) and ZS9F (28,157) W2ZVS was still able to find some new ones by way of GD3AGC, I1RC/Trieste, FQ8SN, TA3FAS, HA5B and GC2ASO while W9HNI adds YV1AU and HL1BJ On continuous wave, W8YFJ has an intriguing undercover claimant in LY1XX ("Sorry, no QSL") as well as GC6OU, VQ4HJP, FA8IH, CN8MR and EK1FM VE3AFY fired up again after quite a layoff and was greeted by c.w. proponents ST2AM, GC4LI, FA8CR and CT1LZ, needing nothing more than a doubling 807 with a folded dipole.

Where:

This is as good a spot as any for the yarn of this month and W8BRA (ex-9TWC) is the perpetrator. Seems as how Dave failed in four or five attempts to coax a card from KB6AD, mainly because of the latter being consistently on the move and snowed with QSLs to boot. Then one day W8BRA sent to the printer for some card samples, being in the market for a new design. You guessed it; one of the samples was a blank for KB6AD! Dave filled it out, sent it to KB6AD's Hawaiian QTH and got it back signed in a matter of days, as simple as that SP5AC writes to W9CFT concerning the QSL Bureau of Poland at the address listed for him later. It is not known whether cards for all SP stations are accepted and distributed but it may be worth a try if you have one hanging fire The

South African DX Contest

C.W. section from 0001 GCT Jan. 21st to 2359 GCT Jan. 22nd. 'Phone section from 0001 GCT Jan. 28th to 2359 GCT Jan. 29th.

Restricted to the 40, 20, and 10-meter bands, with crossband operation not allowed. Off-frequency operation will result in disqualification.

Serial numbers, which are different with each contact, are to be exchanged. For c.w. stations the serial number will consist of a 6-figure group—the first three figures to be the RST report, the second three figures to be the last three figures of the serial number received from the station worked just previously. For the first contact simply add any three figures to the report given. For subsequent contacts give an RST report followed by the serial number of the last station worked. For 'phone stations the serial will consist of a 5-figure group—the first two figures to be the RS report, the last three figures formed as in the case of c.w. stations.

Scoring as follows: 2 points for each station worked in your own country, 5 points for each station worked in other countries (see ARRL list). The multiplier is the number of countries worked on all bands.

Each contestant to submit a logsheet which will have an analysis and the signed declaration, "I hereby declare that my station was operated strictly in accordance with the conditions and rules of this contest and I agree to abide by the decision of the President of SARL in the event of any dispute." Logsheets must show the following: Date, time of contact, band used, call sign, serials sent and received, points claimed, multiplier, number of countries worked. Logs must reach H. R. Bennett, 47 Flower St., Pretoria, South Africa, by April 30, 1950.

Certificates to be awarded top scores in each country.

PK3SJ QTH listed is doing a rushing business for many PK3 entries. You might try it for some of your addressless Java contacts — with fingers crossed, of course.

EA6AF Bartolome Pina, Casa De Aspana Number 2, Palma de Mallorca, Balearic Isles
(QSL via W5AJG)
EA8AN Maurice Henry, Poste Restante, Dakar.
FF8MH F. W. A.
FF8PG Pierre Guillard, Post Box 165, Dakar, F. W. A.
FI8ZZ P. Ferrand, Chef de Section du REF pour L'Indo-China, Chemins de Fer, Saigon
FY8AA Rochambeau, Cayenne, French Guiana
HE1EU (QSL to HB9EU)
HE1HY (QSL to HB9HY)
HP1ET Box 2009, Balboa, Canal Zone
HP1WM Box 2041, Panama City, Panama
KG4AL Box 18, Navy 115, FPO, New York, N. Y.
MP4BAL Bob Leo, W6PBV, Box 11, Manama, Bahrain Island, Persian Gulf
OY2RD N. Storgaard Christensen, % F. Wellejus, Thorshavn, Faeroes Islands
PA1RCD Control Station Prinses, Vinperpark P.T.T., The Hague, GM 15, Netherlands
(QSL via W5MMD)
PJ5RE Radio Cotey, Soerabaja, Java, N.E.I.
PK3LC P. O. Box 222, Soerabaja, Java, N.E.I.
PK3SJ (ex-PY6CV) J. A. Garnier Simoes, % Clube Naval, 180 Ave. Rio Branco, Rio de Janeiro, Brazil
PY1CV
SP5AC QSL Bureau of Poland, P. O. Box 320, Warsaw, Poland
SV0WB 17A Bucharest St., Athens, Greece
T12P Box 1816, San Jose, Costa Rica
VE8MM Baker Lake P. O., N.W.T., Canada
VE8OX Hal Carson, Clyde River, Baffin Island, % Eastern Arctic Control, Ottawa, Ont.
VP1WS Wm. Swan, % Govt. Radio Stn., Belize, British Honduras, C.A.
VP4CO APO 869, % PM, New York, N. Y.
VP4LC (ex-VP4TAC) Jack Correia, % Pan-American Airways, Trinidad, B.W.I.
VP5BF (QSL via W4LUV)
VP8AF Signy Island, South Orkneys, via Port Stanley, Falkland Islands
YV5DO Pablo Estrada, Box 2158, Caracas, Venezuela
ZB1AB Georgette House, Church St., Paceville, St. Julian, Malta
ZB1BD C. J. Curtis, RAF Signals Unit, Malta
ZB2I Nr. 9 Naval Hospital Rd., Gibraltar
ZS6VMO QSL to ZS6T, Rev. D. C. H. Human, P.O. Box 55, Coligny, Union of S. Africa
3V8AJ Box 155, Tunis, Tunisia

Assists on this play are due W1s IAP, IKE, RWS; W2s ADP, AKX, CJX, ZVS; W4s BYF, BPD, FOY, MR; W8s WEN, YFJ; W9s CFT, DGA, W9ARH; KH6PM; The Northern California DX Club's *The Drex*.

Tidbits:

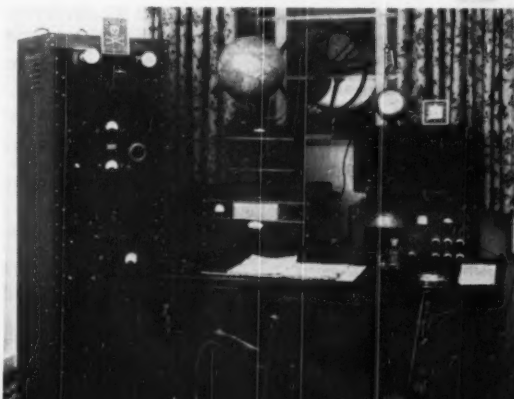
OY3IGO's line bears good tidings. OY2RD is now active on 75 and 20 'phone each night at 2300 GCT, conditions permitting, with an input of 25 watts. He'll be signing the OY prefix for but a few more months, however. OY3IGO, himself, is fairly active but the country's third licensee, OY5WS, is Sparks aboard a trawler with practically no mainland operating time available. Ingvar asserts that all other stations claiming to be in the Faeroes are spoofers. . . . While not polishing up his new 7-Mc. ground plane, W4MR now scratches his noggin re the 20-meter man lately giving the gang conniptions by signing 8AE. Al's pet 250TL passed away, giving him an opportunity to initiate into service his

stock of surplus 304TLs. Gangway, Channel Two! W2RGV contributes more information about the Pietermaritzburg DX Club. This ZS5 outfit was founded in 1948 and now consists of twelve members, all DX specialists. Any non-ZS station contacting five or more of the boys is made an honorary member and is awarded a certificate of merit. Twenty-six sheepskins have been issued so far but no W/V/E has yet made the grade. Upon contacting your fifth Pietermaritzburg station, merely pass along to him the first names and QSO dates of your previous four and you're in. . . . PK2ZZ obligingly air-mailed a card to W2WZ but Al can't produce a QTH to return the favor. Any advice would be much appreciated by W2WZ. . . . A native of Cyprus, ST2TC is able to operate almost daily from 1400 to 2000 GCT on 14,010 kc. Fifteen watts, a Sterba array and an HRO keep Chris satisfied and W6NTR states ST2TC is quite anxious to maintain a sterling QSL policy for all concerned. Incidentally, W6NTR's lil ole BC-458 has reeled off over 100 countries in about a year's time. . . . Word from G5RV may gratify certain of the fraternity. The YT4AX who was active for a few months in 1948 is perfectly okay. The boom was lowered on him, though not too severely, and it is possible that his QSL obligations will be paid up some time in the future. . . . A bid for the distinction of being the world's highest ham is announced by OA4DO. Bob's gear at Cerro de Pasco is located 14,200 tootsies above sea level. OA4DO is consistently active on 29,120 and 28,280 kc. using 150 watts of n.f.m., an NC-240C and a folded dipole. . . . ZS5JQ takes time out during the construction of a new VFO to say via W6CYB that he intends to continue a strict 100% QSL policy. Stations shy a 5/3Q pasteboard need but reapply. . . . Having his hands quite full with the FM8AD QSL situation, W4AZK would like a few points made clear. So far Dave is in possession of only the 15th ARRL DX Contest log and a few more recent entries of FM8AD. It is possible to confirm other contacts but delay in such cases is unavoidable. FM8AD, you know, has been quite active over the years and you'll have to bear with W4AZK during his time of trial on this score. . . . We take special pleasure in welcoming Lew Papp, W3MAC, into the DXCC. Lew turned the trick exclusively on ten 'phone while running 30 to 50 watts input to parallel 6L6s. Being totally blind has not handicapped Lew to the extent of preventing his also holding an EC appointment for his section, an RCC membership and WAC/WAS certificates. Now that he has his DXCC, W3MAC will concentrate on traffic work in conjunction with the Delaware River flood network — an RCA wire recorder aiding in this accomplishment — and we wish him the best of luck on all counts. . . . MD7DC came through with a slough of QSLs, to quote W1IKE, and is particularly interested in WAS. More cards are being printed and 100% QSL is guaranteed. MD7DC usually is found on 14,080 kc. from 2100 GCT onward. . . . Contacts with the British Empire will be difficult for W stations over January 14th-15th and 28th-29th on c.w. and January 21st-22nd on 'phone. Propagational disturbances the cause? Nope. Those are the scheduled dates of the 1950 BERU Contest, open only to amateurs of the B. E. It will undoubtedly be exasperatingly frustrating to hear those juicy VQ9s and ZDTs pop up for the event but let's keep out of their hair for once! . . . We are favored with an interesting epistle through courtesy of W3DPA, same being from the hand of Larry Kelsey of

(Continued on page 118)

The businesslike layout at ZS6SG, operated by H. Black of Johannesburg. The station is designed primarily for 28-Mc. work.

January 1950



Audio Phase-Shift Networks

BY GEORGE H. NIBBE,* W6BES

AMATEUR interest in single-sideband techniques has increased rapidly during the past two years, undoubtedly spurred on by the appearance "on the air" of a considerable number of amateur single-sideband transmitters and the development of new single-sideband receiving methods. The generation of a single-sideband signal has long been possible by the so-called "filter method," but it is only recently that another method has been made practical. This second method,¹ often referred to as the "phasing method," has been incorporated in several amateur designs for single-sideband transmitters and receivers.

In a single-sideband transmitter using the phasing method, the audio modulating signal is first split into two channels, to yield two similar audio signals. However, one of these signals must be delayed by one-quarter cycle, or 90 degrees, with respect to the other. If these two audio signals that differ by 90 degrees are used to modulate two r.f. signals of the same frequency but differing in phase by 90 degrees, the combined output is a single-sideband signal. A related technique can be used in receiving that will reject one or the other sideband of an ordinary a.m. signal, resulting in a high degree of effective selectivity.² The same receiving system is also well suited to single-signal c.w. reception without the need for sharp filters.

The key to these phasing techniques is the network that gives a shift of 90 degrees over the audio range. Several of these circuits were described in 1946,³ and there has also been some more recent discussion of their theory and design.⁴ The audio range over which the single-sideband effects can be maintained depends upon the audio range over which the 90-degree shift can be held. While it is practically impossible to cover the full audio range from 20 to 16,000 cycles, it is not at all difficult to build networks that will hold within $\pm 1^\circ$ over the normal voice range or even the normal music range.

Dome's article on the networks showed several possible circuit configurations. Of these, one type

allows individual adjustment of the resistors and condensers used in the network — the others all require that the absolute value of each component be known accurately if the phase shift is to be held within close limits. For this reason, the adjustable type has enjoyed considerable use, particularly where the networks are to be built by production methods. Each stage requires that the components be stable after adjustment, but their actual value need never be known.

The circuit diagram of a network of the adjustable type is shown in Fig. 1. Three "phase splitters" are used in each of the two branches; the first two tubes give accurately-balanced push-pull outputs that are applied to the RC half-lattice filter sections. The third tube gives push-pull output voltages. Resistors in the half-lattice have a tolerance of 5 per cent, and this possible 5 per cent error is compensated for by adjusting the trimmer condenser at a specified frequency to give a 90-degree phase angle between the input and output of that stage. Once set, the trimmers are secured with cement.

Luck's analysis shows that if the error tolerance at 90 degrees between the two output voltages is specified, the maximum frequency range is fixed over which this error is not exceeded. For example, an angle of $90^\circ \pm 1^\circ$ between the two output voltages can be obtained over a frequency range of approximately 9 to 1, while a maximum error of two degrees allows a frequency range of approximately 17 to 1, etc. If a frequency range greater than 9 to 1 is required, and the maximum error that can be tolerated is, perhaps, one degree, Norgaard has shown that more than two stages can be cascaded to obtain a wider frequency range. However, a 9-to-1 frequency range is adequate for the transmission of speech, and was the basis of the design shown in Fig. 1 and discussed here.

In a single-sideband transmitter, an error of one degree will cause the undesired sideband to be attenuated 41 db. below the desired sideband in an otherwise perfect single-sideband generator. Likewise, in a single-sideband receiver using such a network, the same relation holds. An attenuation of 41 db. is a voltage ratio of 115 to 1; so, for example, a c.w. signal will have 115 times more amplitude on one side of zero beat than on the other side. Since one S unit is about 6 db., seven S units of attenuation of the undesired sideband can be obtained.

The method of alignment, once the alignment frequencies have been determined, has been described elsewhere,^{5,6} but will be repeated be-

*% Canoga Corp., 14315 Bessemer St., Van Nuys, Calif.

¹ Norgaard, "A New Approach to Single Sideband," *QST*, June, 1948.

² Norgaard, "Practical Single-Sideband Reception," *QST*, July, 1948.

³ Dome, "Wide-Band Phase-Shift Networks," *Electronics*, Dec., 1946.

⁴ Luck, "Properties of Some Wide-Band Phase Splitting Networks," *Proc. I.R.E.*, Feb., 1949.

⁵ G. E. Ham News, Nov.-Dec., 1948.

⁶ Goodman, "The Basic Phone Exciter," *QST*, Jan., 1949.

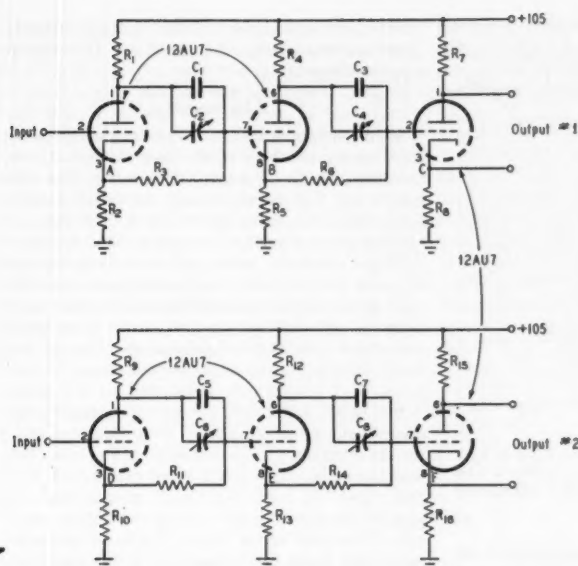


Fig. 1 — Wiring diagram of a 90-degree audio phase-shift network.

C₁, C₂, C₃ — 75- μ fd., \pm 5%.
C₄, C₅, C₆ — 3-30- μ fd. mica trimmer.
C₇ — 820 μ fd., \pm 5%.
C₈ — 25-280- μ fd. mica trimmer.
R₁, R₂ — 1000 ohms, matched to $\frac{1}{2}$ %.
R₃ — 0.27 megohm.
R₄, R₅ — 3300 ohms, matched to $\frac{1}{2}$ %.
R₆ — 3.0 megohms.
R₇, R₈ — 4700 ohms, matched to 1%.
R₉, R₁₀ — 1000 ohms, matched to $\frac{1}{2}$ %.
R₁₁ — 1.0 megohm.
R₁₂, R₁₃ — 3300 ohms, matched to $\frac{1}{2}$ %.
R₁₄ — 1.1 megohm.
R₁₅, R₁₆ — 4700 ohms, matched to 1%.
All resistors $\frac{1}{2}$ watt and \pm 5%.

low. Extreme care is required in the alignment process to eliminate phase-shift errors in the oscilloscope used for indication of the 90-degree phase shifts, and in setting the audio-oscillator frequency accurately to the alignment frequencies. One source of error that may be encountered is distortion in the audio signal generator. A very small amount of distortion will give a false indication of the 90-degree points. (The network is frequency sensitive and delays the harmonics more than it delays the fundamental.) The author has used a low-pass filter to reduce the harmonic content in the audio-oscillator output, but has also found that check points calculated from the mathematical relations involved in the design will quickly indicate an error in alignment and will also allow adjustment to be made to reduce such errors.

When proper precautions have been taken in the alignment process, the phase-shift characteristic is found to be exactly similar to the calculated characteristic shown in Fig. 2. It can be seen that at frequencies below 328 c.p.s. and above 3044 c.p.s. the angle becomes less than 89 degrees. The high-frequency response of the speech amplifier should therefore be limited with a low-pass filter in order to reduce unnecessary interference. The low-frequency response should be cut off below 300 c.p.s. to save power and to make the insertion of the carrier at the receiving end a little less critical.

Fig. 3 shows the amount of attenuation of the rejected sideband as a function of the modulating audio frequency. Over the range of approximately 300 to 3000 c.p.s. more than 40 db. of attenuation

is obtained, and at the four frequencies where the angle is exactly 90 degrees infinite attenuation is obtained.

Fig. 4 shows a curve of the audio-frequency response characteristic that would give 40 db. of attenuation of the undesired sideband regardless of the audio frequency. In a single-sideband transmitter, for example, the speech-amplifier response curve would have to resemble Fig. 4 to obtain 40-db. attenuation of the "wrong" sideband. In a single-sideband receiver the response curve of the audio amplifier following the network should look like Fig. 4. Of course, Fig. 4 is an ideal characteristic; there is nothing sacred about the 40-db. figure, and 30 db. is probably more than adequate. The curves do show that the network should be as

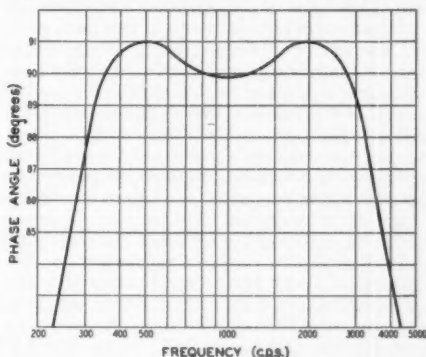


Fig. 2 — Phase-shift characteristic of the network of Fig. 1.

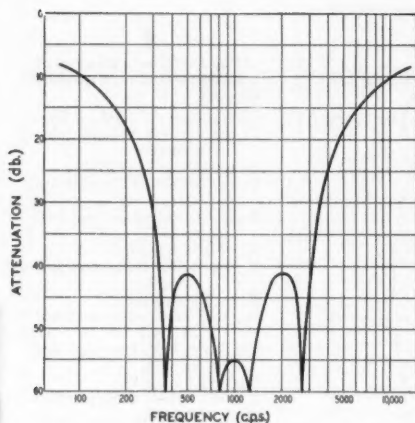


Fig. 3 — Attenuation of undesired sideband at various audio frequencies, using the network of Fig. 1. This is a theoretical curve and assumes perfect adjustment throughout the system.

good as possible, and also the general shape of the filter response curve that is required for good performance. Other factors will reduce the attenuation obtained, so optimum performance of the network and filter will improve the over-all operation.

Any phase shifts that occur in the circuitry associated with the audio phasing networks must be kept to a minimum. If the input and output circuits for one channel are different from those for the other, and either or both have a phase shift of their own, the two outputs will no longer have the relation shown in Fig. 2. This requirement can be satisfied by using condensers of at least $0.1 \mu\text{fd.}$ for the coupling condensers and one-megohm resistors for grid resistors, and by feeding the network from a low-impedance source, such as a cathode follower or an amplifier stage with a low value of plate resistor. These resistors and condensers are not shown in this unit, since the demands of different circuit arrangements vary. A receiver adapter built by the author uses transformer coupling to the input grids, for example. If the values of the coupling condensers and grid resistors are made large enough, phase shift of the coupling circuits will be negligible, and the parts will not require small tolerance — 10 per cent will be adequate.

One other precaution must be taken to insure correct operation of the network. The plate supply voltage should have good regulation, i.e., low impedance, at all audio frequencies within the range of the unit. This unit was designed for a plate supply of 105 volts so that a VR-105 can be used. Current drain for a supply voltage of 105 is 17 ma. Alternatively, a dropping resistor from a higher voltage can be used, with a large electro-

lytic condenser across the low-voltage output. (The condenser must be rated for full power supply voltage.)

Alignment

An oscilloscope and an audio-frequency oscillator having good waveform (low distortion) are necessary for the alignment of the unit. The two inputs are tied together and connected to the audio oscillator, as shown in Fig. 5. The vertical input of the oscilloscope is connected to test point A, Fig. 1, and the horizontal input is connected to point B. The audio oscillator is set to 6363 c.p.s. as accurately as possible, and the gain controls on the oscilloscope are set to give equal horizontal and vertical deflections. One of the 'scope inputs is then disconnected from the test point, and temporarily connected to the other 'scope input. A straight line at approximately 45 degrees should be obtained. If an elliptical pattern is obtained on the screen, it is an indication that the oscilloscope has internal phase shift, and this must be corrected before proceeding. (If possible, to reduce possible sources of phase shift, one of the two 'scope inputs should be at maximum gain. Since the voltage at B is less than that at A, the H amplifier gain could be at maximum in the arrangement described above.) A 1-megohm potentiometer can be connected in series with either the V or H input to attempt to get the desired straight-line pattern. It may be necessary to shunt the potentiometer or the V or H input with a variable condenser of about $150\text{-}\mu\text{fd.}$ capacity to eliminate these phase shifts. After ascertaining that there is no phase shift in the 'scope, the H input can then be returned to point B, and C_2 adjusted for a perfect circle on the

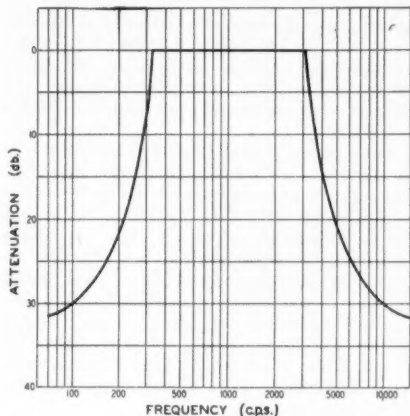


Fig. 4 — Audio passband required to maintain 40-db. sideband attenuation at all audio frequencies, in a perfect system that uses a network with the characteristics of Fig. 3.

screen, indicating a 90-degree angle between the voltage at A and that at B. If the pattern has flat sides the output from the audio oscillator is too great and is overloading the input tube, or there may be excessive distortion in the input signal. The 'scope leads are then shifted to B and C, and the above procedure is repeated with the audio oscillator set at 610 c.p.s. To check that the settings are correct, one 'scope input is then put back on A, while the other is left on C. The audio frequency is then set at 7492 c.p.s., and the 'scope checked for phase shift. A circle should be obtained, indicating a 90-degree angle exists between A and C at that frequency. The oscillator is then set to the second check frequency of 518 c.p.s., and the 'scope again checked for phase

from 328 to 3044 c.p.s. if there is no phase shift in the 'scope over that range. The angle is exactly 90 degrees at 360, 832, 1202 and 2783 c.p.s. when the network is properly aligned.

Construction

All components except the tube sockets can be mounted on a 3 X 4-inch piece of $\frac{3}{32}$ -inch laminated bakelite. The board should be wired before assembly with the tube sockets. Three-quarter-inch spacers tapped at either end are used to fasten the board to the cover plate of the 3 X 4 X 5-inch utility box upon which the tube sockets are mounted. All input, output, and power-supply connections are made to terminals on the terminal board. When the mounting position in the equipment with which the network

is to be used is determined, a $\frac{3}{8}$ -inch hole is drilled on the appropriate side of the utility box, and a rubber grommet inserted after the box is mounted on the chassis.

Once alignment is completed, the board should not be removed from the cover plate, since the wiring will be shifted, changing the circuit capacities and requiring realignment after reassembly.

Appendix

Total Network:

Angle between the two output voltages, θ , is
 $\tan(\frac{1}{2}\theta) =$

$$\frac{s\left(r - \frac{1}{r}\right)\left(\frac{f}{f_0} + \frac{f_0}{f}\right)}{s^2 - \left(r - \frac{1}{r}\right)^2 - 4 + \left(\frac{f}{f_0} + \frac{f_0}{f}\right)^2} \dots \dots \dots (1)$$

where

$$f_0 = \sqrt{f_1 f_2} \quad r = \frac{f_0}{f_1} = \frac{f_2}{f_0} \quad s = \frac{a+1}{\sqrt{a}}$$

$$f_1 = \frac{\sqrt{a}}{2\pi R_1 C_1} = \frac{1}{\sqrt{a} 2\pi R_2 C_2}$$

$$f_2 = \frac{\sqrt{a}}{2\pi R_3 C_3} = \frac{1}{\sqrt{a} 2\pi R_4 C_4}$$

One Channel:

The angle between the input and output voltages for one channel, ϕ , is

$$\tan(\frac{1}{2}\phi) = \frac{s}{\frac{f}{f_1} - \frac{f_1}{f}} \dots \dots \dots (2)$$

and for the other channel

$$\tan(\frac{1}{2}\phi) = \frac{s}{\frac{f}{f_2} - \frac{f_2}{f}}$$

(Continued on page 118)

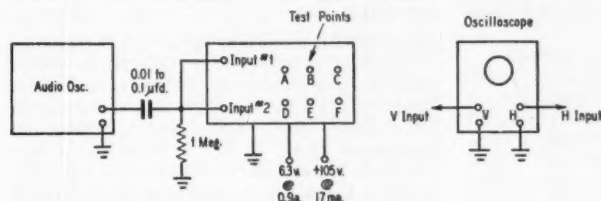


Fig. 5—Arrangement of test equipment for aligning the audio phase-shift network.

shift. A circle should be obtained, indicating a 270-degree angle between A and C at that frequency. The audio oscillator is then set to the third check frequency, 1970 c.p.s., and here a straight line at a 45-degree angle should be obtained, indicating a phase angle between A and C of 180 degrees. If a circle is not obtained at 7492 c.p.s., C_2 should be adjusted for a circle. If a circle is not obtained at 518 c.p.s., C_4 should be adjusted for a circle. These two condensers will have the greatest effect on the phase shift at those respective frequencies, while the middle check frequency of 1970 is a check on both. If the correct patterns are not obtained at the check frequencies, some "jockeying" may be necessary. This indicates that there is distortion in the set-up which may be due to any of the following: distortion in the oscillator or in the oscilloscope, the plate supply is not "stiff," the input stage to the network is being overloaded, or the frequencies were not set accurately.

The same procedure is followed in aligning the other channel, using a frequency of 1640 c.p.s. when adjusting C_6 , with the 'scope inputs on D and E, and a frequency of 157 c.p.s. when adjusting C_8 with the 'scope inputs on E and F. The other check frequencies for this channel are 90 degrees at 1903 c.p.s., with C_6 having the greatest effect on the pattern at that frequency, 270 degrees at 134 c.p.s. with C_8 having the greatest effect, and 180 degrees at 508 c.p.s. as a check on both condensers. With the 'scope inputs connected to C and F, a circle should be obtained



Hints and Kinks

For the Experimenter



ADJUSTABLE TUNING RATE FOR VFOs

IN MOST of the VFO units described in recent years the 3.5-Mc. band has been spread out over the full tuning range of the oscillator dial. While this is a satisfactory arrangement for operation on 80 meters, it crowds the 40- and 20-meter bands badly, resulting in a fast tuning rate that is difficult to use. The arrangement shown in Fig. 1 has been used with success in a Clapp

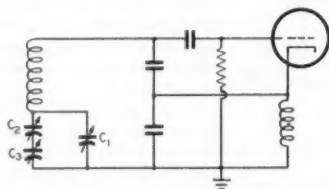


Fig. 1—Handy system of adjusting the tuning rate of a Clapp VFO. Adjustment is described in the text.

C₁—25- μ fd. variable padder.
C₂—50- μ fd. variable padder.
C₃—140- μ fd. variable.

VFO in which the oscillator was on "160," and where harmonics of the oscillator frequency were to be used in the other bands. The effect is to slow down the tuning rate in the lower-frequency portion of the range (where you want it to be slow for multiplying into the higher-frequency bands) and to speed it up at the high-frequency end where frequency multiplication is not called for.

Tuning is done with C₃, which is connected in series with a 50- μ fd. padder. To set the frequency range, first set C₃ at minimum capacity, and adjust the parallel padder C₁ until the harmonic falls at the high-frequency end of the desired tuning range. Then set C₃ at maximum and adjust series trimmer C₂ to bring the low-frequency end of the tuning range to where you want it. These two adjustments interlock to a certain degree, but with care you can get things set so that the desired spread of the low-frequency end of the bands is obtained.

If you find that the tuning rate at the high-

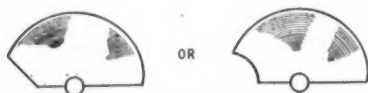


Fig. 2—Notching the condenser plates in this manner will spread the high-frequency end of the tuning range.

frequency end of the dial is now too fast, it can be slowed down by filing away a portion of the rotor plates of C₃ as shown in Fig. 2. In this way, the 75-meter 'phone band can be spread, with some crowding at the middle of the 3.5- to 4-Mc. range, while still retaining the "open" bands spread at the low-frequency end. — Clifford E. Fisher, W0MTF

USING THE BC-221 FREQUENCY METER AT V.H.F.

THE BC-221 frequency meter has a variable oscillator covering either 125-250 or 2000-4000 kc., plus a low-drift 1000-kc. crystal oscillator. Although the accuracy, dial, and stability are excellent for its original uses, its utility for frequencies above 30 Mc. is considerably improved by the addition of the harmonic amplifier shown in Fig. 3. The harmonics of the crystal are then audible every megacycle up to 300 or more, and by switching to "xtal check" and tuning the oscillator in the usual manner, sum-and-difference

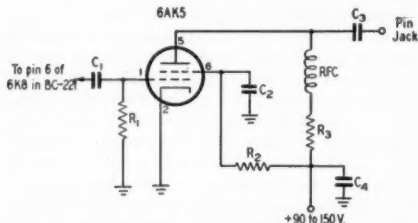


Fig. 3—Schematic diagram of a harmonic amplifier for the BC-221 frequency meter to extend its range to 300 Mc. The unit can be built on a small bracket and attached to the side of the chassis.

C₁—100- μ fd. mica.
C₂, C₄—0.001- μ fd. mica.
C₃—5- μ fd. ceramic.
R₁—3 megohms, $\frac{1}{2}$ watt.
R₂— $\frac{1}{2}$ megohm, $\frac{1}{2}$ watt.
R₃—1000 ohms, $\frac{1}{2}$ watt.
RFC—15 turns No. 22 enam. close-wound on a $\frac{1}{2}$ -watt resistor of any high ohmic value.

frequencies are generated. For instance, with the variable oscillator set at 200 kc., which may be accurately done by beating with the crystal, notes may be found every 200 kc. from 144 to 148 Mc., while when switching to "xtal only" only the megacycle markers remain. Similarly, when the variable oscillator is tuned to 2500 or 3500 kc., beats are evident every 500 kc. If a frequency at 144.101 Mc. were to be measured, the signal could be

(Continued on page 180)



United States Naval Reserve



OVER-THE-AIR code practice is conducted by KØNRZ, U. S. Naval Reserve Training Center, Topeka, Kans. These code lessons were originally inaugurated to assist interested citizens of Topeka and neighboring cities in obtaining amateur operator licenses. As the program has progressed, reports have been received from coast to coast and from as far distant as Hawaii, with high interest in all quarters. One-hour lessons are transmitted on 29.5 Mc. commencing at 7:00 P.M. CST, Monday through Friday. Several hundred individuals are participating in the program. Those benefiting include patients at Topeka's veterans hospital and youths at Boys Industrial School, Topeka.

In addition to the program of code practice, KØNRZ has inaugurated an "Amateur Night," 8:00 until midnight or later each Friday. Regular ham-club discussions are held, but emphasis is on helping the newcomer and development of more efficient amateur operators. One product of the Friday night get-togethers is an amateur radio emergency network for Topeka and vicinity. The following amateurs are members of this emergency network: KØNRZ, net control station, 29.5- and 7-Mc. trunks, emergency power; WØWGM, ARRL emergency coordinator, 3.5-Mc. c.w., 3610 kc.; WØHCV, 3.85-Mc. 'phone, 3920 kc.; WØHOC, 7-Mc. c.w., emergency power; WØUPU, ARRL emergency coordinator, Red Cross; WØSO, State Highway; and the following 29.5-Mc. mobiles: WØICV, ARRL emergency coordinator, WØs QV, ZMC, ABV, HIK, AAZ, ECF, HBL, GBK.

Saturday afternoons at KØNRZ have been set aside for classes in "Fundamentals of Radio." There already are 25 enrollees.

A recent directive from the Chief of Naval Operations changed the name Combat Information Center (CIC) to Command Operations Center (COC) in order to describe better the functions

now performed by CIC. These functions, however, have not been changed for the present.

On 1 November 1949 the Fourth Naval District became 100 per cent in number of U. S. Naval Reserve training centers having amateur radio stations.

Following a devastating typhoon, which hit Guam on 17 November 1949, messages of reassurance were transmitted by amateur radio to friends and relatives of personnel in the stricken areas. Using ARRL-numbered texts, KG6DI, operated on emergency power by a Navy chief radioman, sent traffic on 14 Mc. to W5OM, Comdr. J. M. McCoy, USNR, New Orleans. W5OM forwarded the messages to their destinations in all parts of the country via Western Union.

New commanding officer of Electronic Warfare Company 4-7 at Upper Darby, Penna., is Comdr. P. W. Moor, a member of the Reserve for many years. His amateur call, W3SB, will be remembered from prewar years.

Northernmost of all Naval Reserve drilling units is Electronic Warfare Platoon 17-1 on the island of Kodiak, east of the Aleutians, in Alaska. Lt. Comdr. F. H. LaBree, USNR, is officer-in-charge. The unit is active on the amateur bands with the call KL7NR.

(Continued on page 118)

These amateurs originated the "Over-the-air" code school at KØNRZ, U. S. Naval Reserve Training Center, Topeka, Kans.: (l. to r.) Ed See, WøKRZ; Lt. Comdr. Robert French, USNR, WøTPF; Orville Strimple, WøUPU; Bill Wright, ET2, USNR, WøHOC; Carl Fisher, ET2, USNR, WøHIK; Ed Benton, WøWGM.

January 1950



Debugging the Electronic Bug

Some Improvements on Earlier Models

BY RICHARD H. TURRIN,* W2IMU

DURING the past several years many fully-automatic electronic keyers have been devised. Most of these have been based on the multivibrator principle. Invariably most of these arrangements have shown up flaws, whether electrical or mechanical, which have made them erratic or annoying in practical operation. However, a new circuit described in *QST* for October, 1948,¹ has shown excellent possibilities because of its simplicity and ingenious electrical principle. Unfortunately, practical experiments have shown a troublesome point in the timing network and more specifically in the grid-stabilizing network.

The purpose of this article is to bring out a modification of the original circuit in the timing network and to provide additional information for the successful construction of an electronic key. The modification was first conceived by Bo Brondum-Nielsen, OZ7BO, and put into use with excellent results.

The theory of operation has been covered thoroughly in the original *QST* article mentioned above and will not be repeated here, the basic functions being unchanged in the modification. It is suggested that anyone interested in this keyer should read and understand this original article before proceeding.

Fig. 1A shows the original circuit with the timing and grid-stabilizing network drawn in heavier lines. This part of the circuit will be changed to conform with the modified version of Fig. 1B. The rest of the circuit remains unchanged. The difference between the two circuits is the way in which the dot and dash voltages are obtained. The original circuit uses two series condensers charged from a common supply while the modified circuit uses a single condenser charged from taps on a resistance voltage divider. There are several distinct advantages in the latter method since it eliminates the need for the grid-stabilizing network. This has been the cause of most of the erratic operation. The use of a single condenser in the timing network further improves the circuit to the extent that, unlike the original circuit which has its ratio control in the timing network itself, any changes in the timing network will only affect the speed. The only disadvantage is an increased drain on the power supply.

Fig. 2 is a practical working model using the

new timing network. The *RC* network composed of C_1 , R_1 and R_2 is charged either from a tap at approximately 50–60 volts on the divider (dots), or from the full supply voltage (dashes). This positive charge is applied to the grids of both triodes through the 2-megohm resistor, which prevents the grids from drawing excessive current.

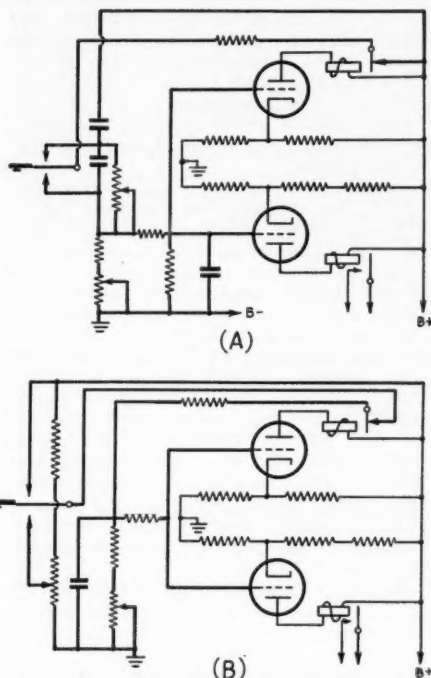


Fig. 1—A—Original circuit from October, 1948, *QST*. B—Modified circuit. Heavy lines indicate portion of circuit under discussion.

The regulation of the power supply, as well as that of the dot tap on the divider, must be reasonably good, since these affect the length of the first dot or dash in a group. The idling-current load, which is between 40 and 50 ma., provides sufficient regulation to a conventional supply of about 275 volts under load. Filtering need not be great but if insufficient may cause erratic operation at higher speeds when the relay action may

* R. F. D. 1, Millington, N. J.

¹ Bartlett, "Further Advances in Electronic-Keyer Design," *QST*, Oct., 1948, p. 27; "Feed-Back," *QST*, Jan., 1949, p. 10.

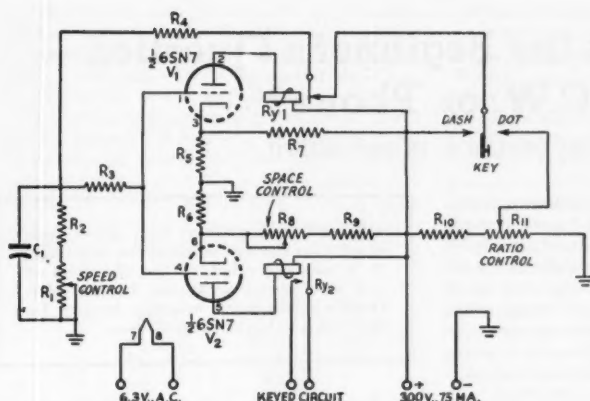


Fig. 2 — The complete circuit as modified by OZ7BO.

C_1 — 0.02- μ fd. 400-volt paper.
 R_1 — 4-megohm potentiometer.
 R_2 — 1 megohm, 1 watt.
 R_3 — 2 megohms, $\frac{1}{2}$ watt.
 R_4 — 510 ohms, $\frac{1}{2}$ watt.
 R_5, R_6 — 2400 ohms, 1 watt.
 R_7 — 25,000 ohms, 5 watts.
 R_8 — 3000-ohm wire-wound variable.
 R_9 — 20,000 ohms, 5 watts.
 R_{10} — 10,000 ohms, 5 watts.
 R_{11} — 3000-ohm wire-wound potentiometer.
 R_{Y1}, R_{Y2} — See text.
 V_1, V_2 — Section of 6SN7.

be affected by the pulsing direct current.

In this model R_{Y1} and R_{Y2} are inexpensive 5000-ohm s.p.d.t. types rated at 5 to 7 ma. closing current. Both relays should be closely matched in mechanical as well as electrical characteristics. If possible, they should be identical. Because C_1 does not charge instantaneously through R_4 , R_{Y1} cannot be a fast-acting or high-speed relay. If this relay opens its contacts too soon it will break the charging current of C_1 at a steep point on the exponential charging curve, causing erratic operation. Although the relays used in this model are of the fixed-contact type, relays with self-wiping contacts are desirable and will aid in eliminating the above-mentioned trouble and in keeping the contacts free from excessive surface resistance — another factor in erratic operation. As in the original circuit, R_4 is included to minimize sparking at the key and relay contacts. R_2 also is included not only to limit the highest speed but, as well, to save R_1 from possibly burning out at one end.

It might be mentioned here that since C_1 and R_1 plus R_2 compose a simple RC circuit, there are infinite combinations which can be used for a given speed. However, the smaller C_1 becomes, the shorter will be its charging time, permitting a faster-acting relay at R_{Y1} . Unfortunately, too small a value at C_1 will make the grid impedance too high and susceptible to stray pick-up of a.c., again resulting in erratic behavior. Consequently C_1 has been chosen at an optimum value of 0.02 μ fd. Even at this value care must be taken to keep the charging and grid circuits out of strong a.c. fields. Another point where trouble may appear is at R_{Y1} where poor insulation between the solenoid and its contacts will pass sufficient current to charge C_1 . Needless to say, good-quality relays will not be subject to this condition.

Proper adjustment of this circuit is the same as in the original article. However, since we are

using a 6SN7, different voltages will be encountered. At a plate voltage of 275, the 6SN7 will cut off at about 25 volts bias. Therefore, the cathode of V_1 is made 25 volts positive, or a similar value that will just cut off plate current. The bias on V_2 will be somewhat higher and is best adjusted once the circuit is in operation. Likewise, the ratio control can be adjusted properly with the circuit in operation.

If the circuit of Fig. 2 is followed closely, only minor adjustments will be necessary — mostly regarding the relay-spring tension to match the conditions of operation. Final adjustment of the dot-dash ratio and space length may be made by methods previously given in QST.

Let me call your attention to the fact that this keyer is a self-completing type. Once a dot or dash has been started by a mere tap of the key lever, one complete dot or dash plus one space are made and this cannot be interrupted or interfered with in any way because of the action of R_{Y1} which disconnects the key lever from the timing circuit for the complete period of mark and space. This feature is very important in accurate and effortless code sending. But, to quote OZ7BO, "A word of warning. Many will find considerable difficulty initially in using the electronic bug, but after a few hours or months of practice, it will become a pleasure to use. A disconcerting feature is that one very quickly becomes aware of the mistakes made previously, and if one tries to maintain the old style of sending, he is promptly greeted with a variety of characters not visualized by Samuel Morse."

Check!

**SWITCH
TO SAFETY!**



Answering the Beginner's Question— “C.W. or 'Phone?”

BY DALLAS T. HURD,* W2PFU

DESPITE the heated blasts of bitter words continually blowing back and forth between dyed-in-the-wool brass pounders and 100% 'phone men, it always has been difficult for the beginning amateur to ferret out the truth about the comparative merits and shortcomings of the two principal methods of amateur communication. Answers tossed by old-timers at young squirts brash enough to inquire about such delicate subjects run the gamut from “Get your ticket, head for 10 'phone, and forget the danged code” to “'Phone's OK if you've nothing better to do than gas with the locals, but the real DX is on c.w.” This treatment may give the beginner some queer ideas of his own but it certainly doesn't provide him with much in the way of useful information for getting started. Nor is the neophyte likely to find much in the way of published material on this puzzlement. So hold onto your hats, gang, here we go.



The big appeal of 'phone operating lies in the fact that most of us find talking and listening to speech easier than pounding brass and copying code. For one thing, we can say so much more in the same length of time. Normal talking speeds range well over one hundred words per minute and the fast talker may hit two hundred or better, whereas most c.w. men stick around 20 w.p.m. and even the “speed merchants” seldom do much over 40 (with readable sending, that is). This balance in favor of 'phone is fine, in theory at least, and certainly works out for the social-minded hams designated as “rag-chewers.” On-the-air listening tests indicate, however, that this 5- or 10-to-1 differential in communication rate is seldom utilized. 'Phone operators generally use up a lot of on-the-air time in useless wordage and repetition while the majority of c.w. practitioners

• W2PFU has written this article primarily for the guidance of the beginner; it is not intended to fan the fires of any long-standing feuds. Incidentally, there's also meat aplenty herein for every clear-thinking old-timer.

ers employ a high degree of abbreviation and terse, to-the-point statements. This is only natural. Most conversation is not particularly efficient and probably would not be pleasing to listen to if it were. In working DX the time spent in actual communication is so greatly outweighed by the time spent in listening and calling that the difference between c.w. and 'phone as regards rate of communication is negligible, especially since most DX contacts are likely to be short and snappy.

It is also true that 'phone contacts are very much more personal than c.w. Human voices, spiced with the accents from different sections, states and countries, are warm and interesting. (And so are all the charming YLs and XYLs one meets on the 'phone bands. On c.w. Gloria De-lovely sounds like any bewhiskered brass pounder regardless of how sweet she may be!) This projection of personality is another reason for the appeal of 'phone operation although experienced c.w. operators often can recognize their acquaintances by their style of sending, or “fist.”

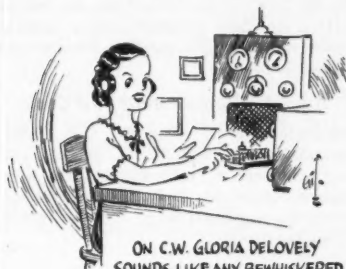
As regards difficulty in operation, leave us face it. We must admit that many fellows find the code just plain hard work and not much fun. Not all of this is attributable to mental laziness, either; it takes years of practice and operating experience to be able to copy 448 code at 30 w.p.m. through QRM, and a lot of hams give it up long before they have reached any high degree of proficiency. Others, exhausted from the struggle of squeezing “13 per” for the license examination, turn their backs on code before the ink on the ticket is dry. It should be said, though, that for those who have the patience and determination to master the code there is a real thrill and genuine sense of achievement in being able to send and copy fast code perfectly. For proof of this, notice sometime how the really snappy solid signals on 40 and 80 just ooze with self-confidence.

In considering the relative number of stations available to be worked, it is pretty much a toss-

*St. David's Lane, Schenectady, N. Y.

up between c.w. and 'phone so far as American amateurs are concerned. The DX countries show a balance in favor of c.w. though, and many of these—including a lot of the really rare DX—are represented on c.w. *exclusively*.

So much for the personal side of the c.w. *versus* 'phone discussion. If you're an old-timer and one of the kilowatt brethren on your local 75 'phone rag-chew net, you probably won't be interested in reading any farther. But let's get down to brass tacks now. According to a recent authoritative publication on radio propagation,¹ the effective-



ON C.W. GLORIA DELOVELY
SOUNDS LIKE ANY BEWHISKERED
BRASS POUNDER

ness of c.w. for satisfactory communication is 17 db. greater than 'phone. This is a big difference, 17 db. representing a power ratio of 50 to 1. For example, if my pair of GL813s running a full kilowatt on 'phone is putting an R5-S9 signal into Zanzibar on a clear channel 20 kc. wide (I should live so long!) my neighbor, using the same kind of antenna system and a GL1614 c.w. rig, running light at a mere 20 watts, can be having communication with the VQ just as effective as mine.

Please note, dear beginner, that this difference is entirely without considering probable interference from other amateurs who conceivably might be calling the VQ. This 17-db. difference arises from the fact that in 'phone most of the intelligence is carried by the relatively weak consonants whereas most of the power transmitted is in the less-effective vowel sounds. In c.w. all of the power radiated is in the form of useful communication. Also, the b.f.o. of the c.w. receiver may exalt the effective strength of the incoming signal.

Now, let us make allowances for the bedlam of QRM usually present on the DX bands and examine the situation again. If my signal is at least 6 db. better than the rest of the crowd, well and good; communication probably will be satisfactory. But let some other fellows with signals just as strong or stronger than mine move in anywhere within 6 or 8 kc. and trouble starts for the guy at the receiving end. On the other hand, with the highly-selective crystal filters we now have, a weak c.w. signal can be pulled through the mess

and copied from between signals that may be many times stronger and much closer than 1 kc.

The difference in communication effectiveness between c.w. and 'phone under conditions of heavy QRM will certainly be much greater than the 17-db. figure mentioned previously. Just how much greater would be very difficult to estimate, since the difference would depend upon the degree and nature of the QRM at the receiving end. It is significant, and not at all surprising, that the military forces' main lines of communication are based on c.w. telegraphy. Long after 'phone has become unreliable, or has faded completely out of the picture, c.w. will still get through. This has been clearly demonstrated during recent periods of emergency communication.

Just a minute though, brother, before you junk the plans for that Class B modulator and turn to the keying chapter of the *Handbook*. Let's have a look at the single-side band systems that have been assuming prominence lately.^{2,3,4} It has been estimated that the use of single-sideband techniques results in a 9- to 12-db. effective gain over regular a.m. 'phone. Add to this the immense reduction in QRM that will result if and when the majority of amateurs turn to single-sideband transmission and the unbalance between 'phone and c.w. starts to even up. Is there any wonder that so much emphasis is being put on single sideband today?

There is one other factor that should be considered here. This is the matter of economy—dollarwise—which certainly is no secret. Watt for watt, a 'phone rig will cost at least twice as much to construct as a c.w. rig, and it will consume from 4 to 6 times as much electric power. Moreover, it will be much harder to adjust and operate properly. If the plain truth were known,



THERE'S A REAL
THRILL IN BEING ABLE TO
SEND AND COPY CODE PERFECTLY

there probably are many c.w. operators who feel that building and operating a 'phone rig is just plain uneconomical both of money and time. With a better than 17-db. difference in communication effectiveness in favor of c.w., this is understandable. The fellow with a 50-watt c.w. rig actually

(Continued on page 180)

¹ D. E. Norgaard, *QST* for May, June and July, 1948.

² O. G. Villard, *QST* for January and April, 1948; Villard and Thompson, *QST* for June, 1948.

⁴ See also *QST's* regular department, "On the Air with Single Sideband."

¹ *Manual of Radio Propagation*, D. H. Mensel, Prentice-Hall, New York, 1948.

3rd V.H.F. Sweepstakes, Jan. 21st-22nd

ARRL Certificates to Section and Club Leaders—Gavel for Winning Club—All Work Must Be on 50 Mc. and Above

BY F. E. HANDY,* WIBDI

THE frank aim of this contest is to work as many v.h.f. stations as possible in one week end. All points from such work will be multiplied by the number of *different* ARRL sections worked. "CQ Sweepstakes, this is W. . . . , over" (on c.w. just "CQ SS de. . . . K") will identify stations desiring to make contest exchanges. The Third Annual V.H.F. Sweepstakes will start at 2:00 P.M. your local time, Saturday, January 21st, ending at midnight Sunday. Phone, m.c.w. or c.w. may be used, with results all contributing to one score.

If an exchange of SS data is completed in both directions *two* points may be claimed. To make it easy to record exchanges they should be sent in the order of information shown. Exchanged information is in the form of a message preamble, with the ARRL section¹ substituted for the city and state, and the RST report for "check." Any station you work is good for *one* point in the score if you get the other operator's acknowledgment of "message," whether he is in the contest for score or not.

Contest reporting forms for your convenience will be sent free on request. Neither advance entry

nor forms is *required*. Follow the log arrangement shown. All lists, small or otherwise, are welcomed by ARRL to help support claims and make complete results in QST possible. Report as soon as the test is over.

Awards—Individual and Club

Certificate awards will go to V.H.F. Sweepstakes winners in *each* ARRL section and to leading operators of clubs where three or more submissions are received. A *club gavel* goes to the club with top aggregate score. Get set for a v.h.f. operating week end!

Rules

1) *Eligibility:* Amateur operators in any field-organization section¹ operating fixed, mobile or portable *under one call* on or above 50 Mc. are invited to take part.

2) *Object:* Amateurs in U. S. and Canadian sections of the ARRL field organization will attempt to contact as many other stations in as many sections as possible.

3) *Contest Periods:* The contest starts at 2:00 P.M. your local time Saturday, Jan. 21, 1950, and ends at midnight Sunday, Jan. 22, 1950.

4) *Exchanges:* Contest exchanges, including all data shown in the sample, must be transmitted and receipted for as a basis for each scored point.

5) *Scoring:* (a) Contacts count *one point* when the required exchange information has been received and acknowledged, a *second point* when exchange has been completed in both directions.

(b) Final score is obtained by multiplying totaled points by the number of *different* ARRL sections¹ worked (the number in which at least

* Communications Manager, ARRL.

¹ See list of sections in the ARRL field organization, page 6. Awards include Puerto Rico, Hawaii, Alaska. In operating use section name abbreviations such as E. Mass., R. I., W. N. Y., Neb., N.Y.C.-L.I.

² In 'phone RST exchanges only two numerals need be used. Say *Readability*. . . *Strength*. . . On c.w. full 3-number RST reports should be logged.

³ Where only one point is made on a contact you can add a point by working this station again for exchange in the opposite direction later. Leave right or left report column blank so that other pairs of exchanges completed in one contact are side by side in your report.

EXPLAINING V.H.F. SS CONTEST EXCHANGES

Send Like Standard Mag. Preamble	NR	Call	CK	Place	Time	Date
Exchanges	Contest numbers 1, 2, 3, etc., a new NR for each station worked	Send your own call	CK (Readability . . . Strength . . . or RST ² of station worked)	Your ARRL section ¹	Send time of transmitting this NR	Send date of QSO
Purpose (example)	QSO NR tells how you are doing. (NR 1)	Identification (WIAW)	All exchange reports (589)	Section ¹ vital contest data. (E. Mass.)	Time and date must fall in contest period. (6R55 P.M. Jan. 21)	

STATION W. . . — SUMMARY OF V.H.F. SWEEPSTAKES EXCHANGES

Freq. Band (Mc.)	SENT (1 point)				Time .. ST	Date (Jan.)	RECEIVED (1 point)				Time	Date (Jan.)	Number of Each Different New Section as Worked	Points
	NR	Stn.	CK- RST	Section			NR	Stn.	CK- RST	Section				
50	1	W1AW	57	Conn.	4:15 P.M.	21	3	W1QIX	47	Conn.	4:18 P.M.	21	1	2
50	2		43		4:35 P.M.	21	7	W1HDQ	59	Conn.	4:40 P.M.	21	..	2
50	3		58		9:00 P.M.	21	6	W1EIO	359	Maine	9:11 P.M.	21	2	2
144	4		49		9:30 P.M.	21	32	W1CLS	58	E. Mass.	9:36 P.M.	21	3	2
144	5		57		9:50 P.M.	21	15	W1SF	58	Conn.	9:46 P.M.	21	..	2
50	6		54		11:30 P.M.	21	11	W2OHE	48	N. Y. C.-L. I.	11:32 P.M.	21	4	2
144	7		58		11:35 P.M.	21	30	W1QIX	57	Conn.	11:35 P.M.	21	..	2
144	8		57		11:45 P.M.	21	21	W3MKL	59	Md.-Del.-D. C.	11:56 P.M.	21	5	2
144	9	W1AW	34	...	8:50 A.M.	22	37	W4FNR	59	E. Fla.	12:34 A.M.	22	6	1
50	10		479		9:15 P.M.	22	12	W3AJG	379x	W. Mass.	8:47 A.M.	22	7	2
50	11		559		10:40 P.M.	22	20	VE1QY	599	N. Tex.	8:20 P.M.	22	8	2
										Maritime	11:35 P.M.	22	9	2

No. Bands Used: 2

9 Sec., 23 Pts.

Number and names of operators having a share in above work

Claimed score: 23 points X 9 sections = 207.

I hereby state that score and points set forth in the above summary are correct and true.

Equipment:

Signature

Address

Tube line-up

Number different stations worked

one SS point has been credited).

6) *Conditions for Valid Contact Credit:* (a) Repeat contacts in other bands confirmed by completed exchanges of up to two points per band may be counted for each different station worked. (Example: W1XXX works W3MQU on 50 and 144 Mc. for complete exchanges, 2 points each on each band. 2+2 gives 4 points but only one section multiplier.)

(b) Crossband work shall not count for any points or sections.

(c) All work for one entry must comprise points made while operating in a given ARRL section.

7) *Awards:* Entries will be classified as single- or multioperator, a single-operator station being defined as one manned by an individual amateur who neither receives assistance nor gives assistance to any person in the contest period. Certificates will be granted based on the leading work in the single-operator classification in each ARRL section. Multioperator work will be grouped separately in the QST official report of results.

When three or more individual club members compete and submit logs naming the club with which they are identified, an ARRL certificate will be issued through such club to the leading individual in the local competition. When less than three individual logs are received there will be no club award or club mention.

A gavel with engraved sterling-silver band is offered the club whose secretary submits the greatest aggregate score, such claim successfully

confirmed by individual amateur reports (resident club members only) which mention the club.

8) *Conditions of Entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the Award Committee.

9) Reports from all entrants must be postmarked no later than February 6, 1950, to be considered for awards.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

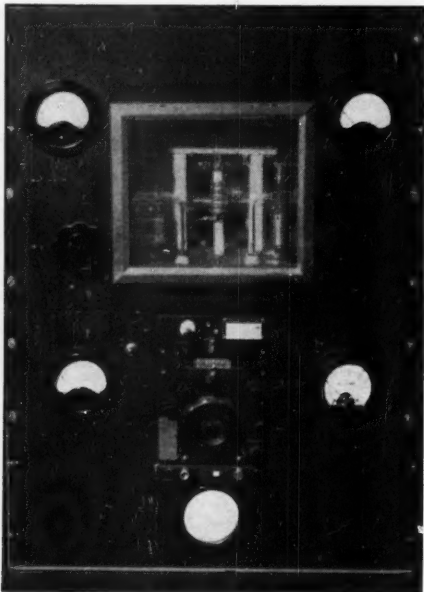
W1AE, Francis Lebaron, Brookton, Mass.
W1ALY, Samuel Perlmuter, Brighton, Mass.
W1FKS, Joseph D. Valliere, Cambridge, Mass.
W2ROG, Arthur F. Sandroni, Riverside, N. J.
W2RSF, J. Taylor Stokes, Ventnor City, N. J.
W2TVF, Edmund D. Walters, Hamburg, N. Y.
W2VJR, Edwin J. Ramhorst, Highland Park, N. J.
W2WFD, Capt. Wm. F. Parker, USAF
W3NPB, ex-W9NHJ, Howard M. Williams, Drexel Hill, Penna.
W4BTI, A. Lynne Brannen, Marietta, Ga.
W4PCG, Karl B. Brumback, Farmville, Va.
W5HN, James L. Bradberry, Little Rock, Ark.
W5NMD, Mrs. Mildred B. Coulter, Tulsa, Okla.
W6WKL, John P. Jones, Hayward, Calif.
W8TO, Howard R. Young, Columbus, Ohio
W9TRK, C. A. Martin, Emporia, Kans.
W9WZL, Ray J. Boeckner, Cozad, Nebr.
W9ZBN, John E. Carpenter, Wheatridge, Colo.
KH6JA, ex-W7BTG, Harper W. Skuse, Honolulu

• Surplus Corner —

Plug-In Exciters from "Command" Transmitters

IF you have a medium- or high-power transmitter, you probably go through a fair-sized operation every time you change bands. Even if you bandswitch the exciter, you still have to change coils in the grid circuit of the final, plus plate coils, followed by a careful retuning process that is both time-consuming and bothersome, to say nothing of being somewhat dangerous. Shown here is a system in which plug-in exciters, each containing a pretuned plug-in grid circuit for the final amplifier, are made from the well-known "Command" (SCR-274, ARC-5) transmitters. Similar set-ups are used at both W9UHF and W9ZHL to cover all bands from 3.5 through 50 Mc.

The physical layout is shown in the accompanying photograph. The final amplifier occupies the upper deck of a standard rack, and the lower deck is arranged so that the Command rigs can be plugged into a slot cut in the panel below it. The exciters are so compact you'll have room left over



An ingenious method of obtaining separate plug-in exciters for each band, devised by W9UHF and W9ZHL. The now-famous "Command" transmitters are utilized in a flexible arrangement that generates enough power to drive a high-power final amplifier on all bands from 3.5 to 50 Mc.

for some of the "extras" that go to make a more complete set-up. For example, in the unit shown, a 2-inch modulation monitor patterned after the one described in a recent *QST*¹ is included in the chassis that accepts the plug-in exciter.

The circuit diagram of a typical modified Command transmitter is shown in Fig. 1. Note that the plate circuit of the second 1625 is link-coupled to another tank circuit which is connected to a three-terminal plug. This serves as the grid circuit in the final amplifier. It is placed in the space formerly occupied by the antenna loading coil in the original set-up. The other changes in the original units are shown in the schematic diagram and depend largely on the output frequency desired. They are described below.

The added grid coil is supported on 3-inch stand-off insulators fastened to the chassis by screws that pass through the holes formerly occupied by the loading-coil mounting screws. Plugs made of salvaged knife switches with the blades bent at right angles were mounted on the same insulators, placed so that they would contact jacks placed on the grid terminals of the tube sockets in the final amplifier when the exciter is plugged in. The bias connection (center tap) is made of a banana plug mounted on a ceramic insulator supported through one of the holes in the front panel left when the antenna relay was removed. The grid choke, by-pass condenser, etc., are mounted in the final-amplifier chassis, and thus do not need to be duplicated for each unit.

This arrangement provided plenty of drive for a pair of HK-257-B tubes in the final on the lower-frequency bands, and enough for a pair of 715-Bs in the 50-Mc. final. The modifications to the original Command transmitters to provide the necessary drive in these various bands are quite standard with the exception of the one used to get to 50 Mc. In brief, the modifications are as follows:

3.5-Mc. exciter: One of the 3- to 4-Mc. transmitters was used, with one of the 1625 output tubes removed. The antenna loading coil was removed and the grid coil for the final amplifier installed as described above. Coil data appear below the schematic diagram.

7-Mc. exciter: A 7- to 9-Mc. transmitter was modified by removing one of the 1625s and the antenna loading coil as in the 3.5-Mc. unit, and the grid circuit for the final amplifier was added as in the 3.5-Mc. unit.

¹"Built-In Oscilloscope for Modulation Monitoring," *H & K, QST*, April, 1948, p. 58.

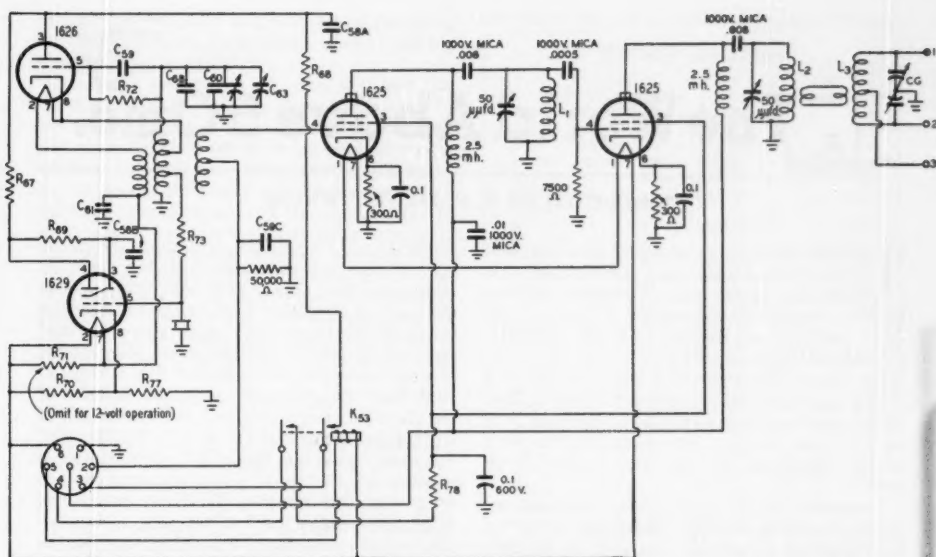


Fig. 1—Schematic diagram of a typical plug-in exciter unit built from a "Command" transmitter. Parts designated by symbols such as C_{59} and R_{72} , etc., are already in the transmitter, and need not be changed. Values for new parts, with the exception of the coils and the final-amplifier grid condenser, are indicated on the diagram. Constants for these parts are tabulated below. Note that this circuit is used only in the 28- and 50-Mc. exciters. In all others only one 1625 stage is used.

- C_g —3.5-, 7-, 14-, 28-Mc. units — 50 μ fd. per section.
 — 50-Mc. unit — 27 μ fd. per section.
 L_1 —3.5 Mc. (not used).
 — 7 Mc. (not used).
 — 14 Mc. — 26 t. No. 14 enam., $\frac{5}{8}$ -inch diam., close-wound.
 — 28 Mc. — 22 t. No. 14 enam., $\frac{5}{8}$ -inch diam., close-wound.
 — 50 Mc. — 10 t. No. 14 enam., $\frac{1}{2}$ -inch diam., close-wound.
 L_2 —3.5 Mc. (not used).
 — 7 Mc. (not used).
 — 14 Mc. (not used).
 — 28 Mc. — 14 t. No. 14 enam., $\frac{5}{8}$ -inch diam.,

- spaced to occupy $1\frac{3}{4}$ in.
 — 50 Mc. — 9 t. No. 14 enam., $\frac{1}{2}$ -inch diam., spaced to occupy $1\frac{3}{4}$ in.
 L_3 —3.5 Mc. — 86 t. No. 28 enam., c.t., close-wound on $\frac{5}{8}$ -inch diam. form.
 — 7 Mc. — 43 t. No. 28 enam., c.t., close-wound on $\frac{5}{8}$ -inch diam. form.
 — 14 Mc. — 30 t. No. 14 enam., c.t., close-wound, $\frac{5}{8}$ -inch diam.
 — 28 Mc. — 16 t. No. 14 enam., c.t., spaced to occupy 2 in., $\frac{5}{8}$ -inch diam.
 — 50 Mc. — 16 t. No. 14 enam., c.t., spaced to occupy $1\frac{3}{4}$ in., $\frac{1}{2}$ -inch diam.

14-Mc. exciter: A 7- to 9-Mc. unit was used with one of the 1625s serving as a doubler, the other omitted. In this case L_2 is not needed as enough drive can be obtained from one tube.

28-Mc. exciter: A 7- to 9-Mc. transmitter was used with one 1625 doubling to 14 Mc., the other to 28 Mc.

50-Mc. exciter: A 7- to 9-Mc. transmitter was used with the oscillator changed to operate at 12.5 Mc. This is accomplished by taking a few turns off the 1626 grid coil and moving the cathode tap toward ground until it tunes 12.5 Mc. near the center of the scale. Turns are then removed from the filament winding until it is even with the cathode tap. With the oscillator on 12.5 Mc. the first 1625 doubles to 25 Mc. and the second to 50 Mc.

The method used in changing the oscillator to cover 12.5 Mc. can be employed in converting the 4- to 5.3-Mc. and 5.3- to 7-Mc. units for 7-, 14-,

21- and 28-Mc. exciter use if you can't obtain the units designed for use at ham frequencies. In all cases the dials can be recalibrated with your receiver and if more accuracy is needed, the calibration can be accomplished with the aid of a frequency standard. Inexpensive crystals may be used in the tuning-eye circuit to indicate band edges, and in fact two crystals in parallel have been used to mark both ends of the band. — *T. Glade Wilcox, W9UHF, and Charles Hoffman, W9ZHL*

**SWITCH
TO SAFETY!**





The World Above 50mc.

CONDUCTED BY E. P. TILTON,* WHDQ

THOUGH two years have passed since the peak of the current solar cycle, international DX on 50 Mc. continues as if someone had forgotten to notify the ionosphere. A check of the daily activities of HC2OT, YV5AC, CE1AH, OA4AE, OA4BG and LU9EV shows that only three days in November were without some sort of DX opening on 50 Mc. in South America. Possibly even these dates might have been filled in if we had more complete information on the work of the numerous LUs and PYs known to be active.

Transcontinental openings in this country during November exceeded those observed in the corresponding period last year and on the 20th conditions were nearly equal to the best that November, 1947, had to offer. This opening gave W6WNN, La Mesa, Calif., a contact with W1CGX, Brattleboro, Vt., for what is believed to be the first 50-Mc. WAS by any operator outside the Middle West. Contacts were made with the Hawaiian Islands by West Coast stations on several occasions, and the first two-way work between South America and the Pacific Northwest took place.

By now it has become well recognized that extreme DX opportunities on north-south paths may follow closely on the heels of ionospheric

disturbances. Under such conditions the m.u.f. may be high enough to permit 50-Mc. work between areas that appear to be completely outside the realm of possibility when one checks them on the prediction charts. This phenomenon was first reported by G6DH,¹ following his observations of m.u.f. variations on the path to South Africa in 1947. Our first evidence, in this hemisphere, of the tie-in between aurora and north-south DX of an intercontinental nature came in January and February, a year ago. Probably the first American operator on 50 Mc. to put this information to work was Bill Coburn, W1ELP, Cambridge, Mass., who made a point of watching the 6-meter band on the morning of Feb. 22nd, last, having seen the visible aurora the night before. He was rewarded by the first 50-Mc. contact ever made by a W1 with South America. HC2OT was officiating at the other end.

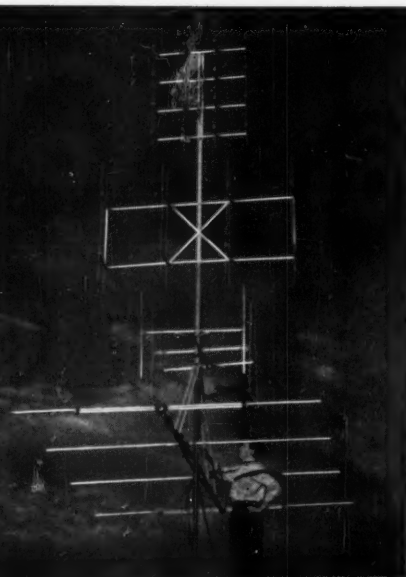
In the period since, every instance of South American work on 50 Mc. from the northern part of the United States has occurred immediately following an ionosphere storm. Taking it the other way around, for each pronounced ionospheric disturbance observed in the spring and fall aurora periods there has been some instance of 50-Mc. DX between North and South America.

A New WIAW Service

This well-documented connection between ionospheric disturbances and extreme north-south DX on 50 Mc. was one reason for the inauguration of a new ARRL service available to listeners on WIAW. Each evening following the regular bulletin transmissions on all bands, 1.8 through 144 Mc., the latest information on coming ionospheric disturbances is being given on WIAW. Based on information supplied by the Central Radio Propagation Laboratory of the National Bureau of Standards, this covers the dates of anticipated disturbances for a period two weeks in advance. Normally the transmitted information is changed weekly, but occasionally

What does a WIAW operator do in his spare time? This shot gives the answer in the case of Tom McMullen, W1QVF. This amazing structure, mounted on the roof of the Headquarters office building, includes 4-element 50-Mc., 6-element 144-Mc., 16-element 220-Mc., and 32-element 420-Mc. arrays. Photo by W1RNT.

QST for



* V.H.F. Editor, QST.

¹ "Any DX Today?" Heightman, QST, January, 1948.

last-minute revisions come through, necessitating the changing of the transmission content relating to imminent disturbances.

Amateur operators of all types will find this information useful, but it is of particular value to the v.h.f. enthusiast. It has been demonstrated that these CRPL predictions are normally quite accurate, so v.h.f. men should have ample warning of aurora-reflection and north-south DX openings on both 50 and 144 Mc. Get the W1AW habit now, if you don't already listen regularly. The operating schedule appears in every other issue of *QST*, with the latest information on page 68 of this issue. In addition to the short warnings transmitted daily, other news of interest to v.h.f. workers is transmitted from time to time. Watch W1AW for the newest v.h.f. developments.

November Details

The month got off to a fine start with an evening of activity on the 1st that sounded more like June than November. Very short skip was in evidence over most of the country, with signals exhibiting a mixture of aurora and sporadic-E characteristics. An example of the coverage: Stations in eastern New England were hearing just about every state east of the Mississippi, plus VE1 and VE3, with signals coming in from as near as W2RLV, Honeyey Falls, N. Y., 300 miles to the west.

What is believed to have been the first contact between a station in the Pacific Northwest and South America was made the following day. That morning W3CIR/7, Bremerton, Wash., had just finished raising his 6-meter beam, and following his first loading check he worked W6IWS at 11:05 a.m., followed by LU9MA, Mendoza, Argentina, at 11:10. W6IWS also worked LU9MA. The same noontime W2BYM, Lakehurst, N. J., worked LU4DI, who had just been working W6s.

W7s found the band open to Argentina again the following morning. LU1BV worked W7DYD, W3CIR/7 and W7JPA in an opening that ended for the W7s about 11 a.m. PST. The Argentine stations were also working into W6 at the same time, but details are lacking except for the report of W6TMI, who worked LU9MA and LU1EV between 9:55 and 10:12 a.m. The first transcontinental opening of the season also broke on the 3rd, with W2BYM and W1HMS working W6TMI.

HC2OT took the ball on the 5th and 6th, working W5s ML, PVR, VY and EMY on the 5th, and W6s TMI, OB, WSQ, and K6BF on the 6th, with YV5AC added during the evening. What was probably the first LU-VE 50-Mc. QSO linked LU9MA and VE7BQ on the 11th. HC2OT worked W9ZHL at 10:03 a.m. EST on the 12th and again on the 13th, along with W9JMS and W5EMY, in an opening ending at 10:05 a.m. W1-W6 contacts were made in brief noontime flurries on the 11th, 12th and 13th. The area over which these W6 signals were heard was very sharply defined. Southern California W6s were heard working VE1QY by various W1s, but only those east of the Connecticut River. W1CGY, Enfield, Conn., was getting readable voice signals from W6s PUZ, TMI, IWS, and WNN on the 13th, while W1LLL and your conductor, only 16 and 20 miles, respectively, to the southwest, were unable to make out more than very faint carriers. The east-west opening (by then an expected daily occurrence) showed up later on the 14th, with W1ELP, Cambridge, Mass., working W6FFW and W6CDQ after 2:10 p.m. EST. W2NSD, Brooklyn, N. Y. (encouraged to get started on 6 after listening to W1AW Bulletin 214) also worked W6CDQ, who was running only 7 watts input!

The period between the 14th and the 19th is devoid of DX reports from this country, except for what appeared to have been a sporadic-E opening between XE1GE and the Texas W6s between 7:30 and 9 p.m. CST on the 15th. An aurora on the evening of the 19th set the stage for another fine opening to South America on the 20th, and the gang

2-Meter Standings

Call				Call			
States		Areas	Miles	States		Areas	Miles
W1PIV	13	5	250	W5JTI	9	5	560
W1HDQ	13	5	490	W5ML	2	1	425
W1BCN	12	4	500	W5AJG	2	1	400
W1CTW	12	4	500	W5IRP	2	1	345
W1REZ	11	4	-	W5FSC	2	1	250
W1JSM	10	3	-	W5JLY	1	1	1000*
W1GJO	10	3	-				
W1JMU	9	3	-	W6ZEM/6	1	1	415
W1OOP	9	3	-				
W1QXE	9	3	-	W8UKS	18	7	720
W1MBS	8	2	275	W8WJC	18	7	700
W1AW	5	2	-	W8BFQ	15	6	600
				W8WSE	14	6	520
W2BAV	14	5	430	W8WRN	13	5	-
W2NLY	13	5	515	W8CYE	12	6	-
W2NGA	13	5	-	W8CPA	12	-	650
W2DFV	13	5	350	W8BAX	9	-	-
W2CET	12	5	405	W8DIV	8	4	-
W2WLS	12	4	-	W8RDZ	7	4	340
W2DPB	12	5	500	W8WAB	4	4	-
W2QNZ	11	5	-				
W2NPJ	11	5	500	W9FVJ	13	6	680
W2FJA	10	4	-	W9JMS	12	5	600
W2PIX	9	4	-	W9PK	10	5	-
W2WGH	9	4	-	W9OBW	8	4	-
W2BNX	7	4	300	W9NFK	8	4	410
W2FJH	7	3	-	W9UTA	5	3	205
W2RPO	5	4	-				
W2UTH	5	4	-	W9NFM	14	7	660
W2UXP	4	4	-	W9EMS	13	5	860
				W9WGG	10	4	760
W3RUE	15	7	760	W9IFB	9	6	-
W3KBA	13	6	-	W9BZE	8	4	520
W3QWW	13	6	900	W9HAQ	8	4	-
W3GKP	13	5	610	W9DEN	7	4	520
W3KWH	12	6	-	W9JB	6	3	-
W3KUX	12	5	575	W9GOK	6	-	-
W3PGV	11	5	-	W9HXY	5	2	-
W3BLF	10	6	-	W9JHS	4	2	-
W3KWL	10	5	-				
W3GY	9	5	660	VE1QY	9	3	650
W3HB	9	5	-	VE3AIB	8	5	520
W3LMC	9	4	-	VE3PFB	6	4	-
W3KWU	8	3	-	VE3ANY	4	-	-
W3VVS	7	4	430				
W4IKZ	13	5	500				
W4CLY	12	5	500				
W4FJ	12	5	450				
W4FBJ	11	5	-				
W4MKJ	10	5	475				
W4HHK	10	5	650				
W4JFV	9	5	860				
W4OLK	9	4	500				
W4ODG	9	4	500				
W4JHC	8	4	500				
W4AJA	8	4	-				
W4NRB	8	4	-				
W4FQI	6	-	-				
W4KKG	5	-	-				
W4LNG	4	2	-				
W4DLX	3	1	275				

* Crossband.

NOTE to 2-meter operators:
If your listing is incorrect or incomplete, please send in the correct information. Also, how about more mileage listings from W6 and W7, and more information on leaders in W9?

turned up in force that Sunday morning. They did not have long to wait. At 8:50 a.m. EST HC2OT changed from 10 to 6 meters, and was heard by W1CGY and W1LLL in the process. Thus started another round of contacts—a two-hour session during which Steve brought the membership of the International Order of Tropical Tramps (you cross the Equator on 50 Mc. to work HC2OT to join) to 115. Steve's list, in the order of the rapid-fire contacts: W1s LLL, CGY, ATP, HDQ (at last!), CLS, AEP, W4IJJ, W2BYM,

50 WAS Mc.

Standings as of November 25th

W9ZHB	48	W8AJG	47	W8QYD	44
W9ZJB	48	W8VY	47	W8CMS	39
W9QVJ	48	W8JTI	44	W8YLS	38
W9BJV	48	W8JLY	43	W8NQD	38
W9CJS	48	W8ML	42	W8WSE	36
W9WNN	48	W8VY	42	W8LBH	36
		W8ONS	41	W8RDZ	27
		W8FSC	41	W8RFW	25
W1CLS	45	W5HLD	40		
W1CGY	44	W5FRD	38	W9HGE	47
W1LLL	43	W5DXB	35	W9ZHL	47
W1HDQ	42	W5ZZF	34	W9PK	47
W1KHL	41	W5NHD	33	W9ALU	46
W1LSN	40	W5GNQ	32	W9JMS	45
W1HMS	38	W5JBW	32	W9QKM	45
W1GJO	37	W5IOP	30	W9QRM	44
W1RO	36	W5IRP	29	W9UTA	44
W1ELP	36	W5LWG	26	W9UNS	42
W1DJ	36				
W1JLK	35				
W1EIO	35	W6UXN	47	W6USI	47
W1HIL	31	W6OVK	40	W6QIN	47
W1CGX	31	W6IWS	40	W6DZM	47
W1FZ	27	W6ANN	38	W6NFM	47
		W6BPT	35	W6INI	47
W2RLV	45	W6AMD	35	W6KYF	44
W2BYM	42	W6NAW	35	W6JHS	44
W2IDZ	40	W6FPV	34	W6PKD	43
W2AMJ	38	W6BWG	25	W6YKK	43
W2QVH	37	K6BF	17	W6TKX	43
W2FHJ	33			W6SV	42
		W7HEA	47	W6HXY	41
W3QUJ	44	W7BQX	45	W6IPI	39
W3OR	35	W7DYD	45		
W3RUE	34	W7ERA	43	VE3ANY	38
W3MKL	33	W7JRG	40	VE1QZ	32
		W7BOC	40	VE1QY	28
W4FBH	45	W7JPA	40	VE3AET	27
W4EQM	44	W7FIV	40	HC2OT	25
W4QN	43	W7CAM	40	VE4GQ	20
W4LNG	42	W7KFM	40	XE1GE	19
W4GIY	40	W7FDJ	36	XE2C	14
W4EID	40	W7FFE	35	VE2GT	14
W4EQR	40	W7KAD	35	XE1QE	10
W4CPZ	39	W7ACD	32		
W4DRZ	38	W7QAP	32		
W4MS	38	W3CIR/7	32		
W4FQI	34				
W4GMP	34				
W4WMI	33				
W4FNR	33				

Calls in bold face indicate holders of special 50-Mc. WAS certificates, listed in the order of the award numbers. All other listings are based on unverified reports.

W3MXW, VE3AJJ, W5VY, W4CVQ, W2RLV, W9PK, W9JMS, W8EAG, W8CMS, W8NQD, W3QFL, W9MBL, W9ZHL, VE1QZ (first VE1 OSO with South America?), W1s RO, HDE, QVF, DJ, GJO, HMS, W2AMJ, W1BWJ, W1CLS.

The signal from HC2OT was audible throughout the entire period at W1HDQ, though only during the contacts with this area was he at maximum strength. We took these opportunities to make test transmissions on 50.0, 50.2, 50.4 and 50.55 Mc., to determine whether there was any point in crowding the low edge under such conditions. Steve noted

no loss in signal strength, and reported that during the 50.55-Mc. test ours was the only signal coming through anywhere in the band — and that at 89 plus 20 db! M.u.f. checks earlier had shown nothing coming through above about 40 Mc. — was this another example of the band opening "from the top down"? You may remember that G6DH occasionally used to hear U. S. f.m. stations around 45 Mc. when nothing else was coming through from this country higher than about 25 Mc.

The South American business was over at 10:55 A.M. EST, but by 11:15 the W6s began to pop through, and until 1:45 P.M. there followed such a session of transcontinental communication as has not been seen on 50 Mc. since the best days in November, 1947. It would be impossible to list a fraction of the contacts made, with upward of 30 W6s banging into W1, 2, 3, 4 and VE1. Power seemed of no account, and several W6s using 3 to 6 watts input were coming in with the best of them. Frequency mattered little, too; signals up to 51.2 Mc. were as strong as on the low edge. There is little doubt that much higher frequencies could have been used, had anyone been looking higher. The skip was as short as 2000 miles. W1CLS reports working W5s ESZ and LKP, El Paso, Tex., and W7s QLZ and MOW, Phoenix, Ariz., were working plenty of W1s.

From this part of the country it was all in that direction, but the familiar "X" pattern of the 1947 openings was in evidence. W7JPA, Yakima, Wash., worked W4IUI, West Palm Beach, Fla., and W4FT, Wilmington, N. C. W3CIR/7 worked these and W4CVQ, Fayetteville, N. C. VE1QZ worked W5s ESZ and LKP in El Paso, and ZZF in Big Spring, and heard (but could not work) numerous W6s and W7QLZ. The farthest south reported by the W6s was W4FT and W4CVQ, worked by W6IWS.

The opening to the East lasted from 8:45 to about 10:15 A.M. PST for the Washington W7s, but at about 3:30 W7JPA began to hear another weak signal coming through. This was thought to be one of the Seattle gang until he switched to c.w. and was identified as KH6NS, in contact with W7EVO. Ed was raised at 2:50, and W7JPA was able to hear weak signals on the frequencies of KH6PP and KH6OV shortly thereafter. W3CIR/7 also worked one or more of the KH6s.

No W DX was reported thereafter until the 24th, when there was a short W1-W6 opening around 1 P.M. EST. Throughout November the m.u.f. seemed to be rising to nearly 50 Mc. in other directions, and it is believed that contacts might have been made between eastern stations and Alaska, had activity been available there at the right times. Day after day eastern observers (including your conductor, operating W1QVF during lunch periods) heard frequency-modulated tone signals coming through from the northwest on 47 to 49 Mc., often with very high signal levels for one to two hours after noon EST. On one of these days, during a check with W1CGY, Clarke's signals were heard by W7FIV, but otherwise no reports have been received to tie in amateur work with this evidence of high m.u.f.

The last date on which we have information as we write is Nov. 27th, and we hear from CE1AH that KH6PP and LU9MA worked during that evening. Ida says that the band was open for at least eleven hours, beginning at 11:20 A.M. on the 27th, with the LUs in all day and OA4AE appearing around noon. HC2OT heard nothing whatever the entire day.

We wish we had space to present the entire month's observations as reported in detail each morning on 28 Mc. by HC2OT, YV5AC, CE1AH, OA4AE, OA4BG, LU9EV and others. Great credit is due our South American friends for their persistent effort and careful observation on 50 Mc. Faced with a complete lack of local contacts that would discourage many of us, these hardy souls watch 50 Mc. at every opportunity. It is safe to say that few DX chances get by them; our knowledge of what happens on 50 Mc. is being enriched thereby, and operation on the band is being made more interesting for us all.

• Third Annual V.H.F. Sweepstakes — January 21st and 22nd! Complete dope on page 52. Send for report forms today.

Here and There

Santa Barbara, Calif. — When he relinquished XE1KE and returned to live in Santa Barbara as K6BF, BJ thought he was losing out on some of his 50-Mc. fun, but he's been doing all right. In addition to 17 states, K6BF has worked ZLAGY, ZL1s HP, MN, AO, TO, ZL2DS, LU9MA, LU6DO, LU4DI, LU1BV, and KH6s OV, NS and PF.

San Francisco, Calif. — Activity on 50 Mc. is on the increase in the Bay area, according to W6BUR, who lists W6s GCG, NIO, DQY, AJF, CAN, VNH, UOV, VWK, JYR, VQV, DEG, VEV, JKN and ZBS as the troupe presently on the band. Activity is concentrated on Monday nights, but anything interesting that develops over a week end will find a goodly number of those listed above in there pitching.

There is extensive net activity on 144 Mc. The Bay Area Contact Schedule Net operates on 145.35 Mc. each Thursday evening at 8 p.m. with W6VNI as control station. The Sunday morning net activities previously mentioned in this department continue, and a Red Cross Emergency Net, with W6CHP as net control, is in the process of formation. W6VNI, Oakland, has been running successful skeds with W6JCI, Monterey, 150 miles, for nearly two years.

W6GCG and W6BUR also have gear for 220, but have had no contacts as yet. They would be glad to hear from others interested in that band in the Bay area. On 420 the accent is on television. W6VSV has been on the air for some time. W6VQV has a receiver and is working on transmitting equipment. W6VSV transmits his "sound channel" on 144 Mc. W6WCD is transmitting, and W6UOV has camera equipment nearly ready to go. Other 420-Mc. regulars include W6KNH, who is experimenting with f.m., and W6QT, Berkeley, who runs crossband with W6AJF at Sonoma on 144 Mc. with good success.

Collierville, Tenn. — The 144-Mc. pipeline between the Memphis and Jackson, Miss., areas having operated successfully for several months, W4HHK, W5JTI and W5NYH now have gear in the works for 220 Mc. They are also interested to see whether the advancing cold weather will have any effect on the consistent nature of their 144-Mc. communication. Up to now their schedules continue without failure on this 190-mile hop.

Rochester, N. Y. — VE3s in the Toronto area were worked on 144 Mc. by Rochester stations throughout the fall period, whenever there was activity at both ends. W2UTH maintains a regular schedule with VE3ANT, 95 miles, each Tuesday at 8:30 p.m., and with W2UHI, Tonawanda, N. Y., 60 miles, at 9. The first 2-meter contacts between Rochester and Syracuse, N. Y., were made recently when several Rochester stations worked W2UFI/2 and W2SEB in Syracuse.

Salina, Kans. — There is more 2-meter activity in Central Kansas than recent reports have revealed, according to W9PKD. Joe says that he and W9QDH and W9MYG are on regularly, working W8JFE at Abilene. Anyone looking for contacts with that part of the country should check at 9:15 p.m., when some of the gang are usually on. The usual operating frequencies are about 144.1, though others are available when the occasion requires.

Queens Village, N. Y. — Anyone who has held back from trying 2-meter operation because he felt that nothing could be done without a large array will be encouraged by the record of W2BNX. He has worked over 500 different stations in 7 states and 4 call areas — with 8 watts output and a dipole antenna.

Charlotte, N. C. — North Carolina contacts on 2 meters coming up! W4DLX (brother of W4CLY, of Cape Henry Lighthouse fame) is now in business on 2. He has three states and 275-mile DX to his credit, and he should be heard from, come a good opening in most any direction.

Columbus, Ohio — Morning schedules between W8WRN and W9FVJ, Toledo, Ill., will be continued throughout the winter on 144 Mc. Sked time is 7 a.m., but W8WRN is around until 7:30 and W9FVJ until 8. Each Thursday morning W8WRN works W9ASM, Indianapolis, at 8 a.m. W9UCH, Ft. Wayne, is worked nearly every night.

Los Angeles, Calif. — Anyone who has tried to key a 522, when only one power supply is used on the rig, knows that the voltage shift causes a considerable chirp, even though the keyed circuit (usually the cathode of the final) is remote

from the oscillator. W6ZUX uses a VR-90 and a VR-150 in series to supply the oscillator plate and screen voltage at a constant level to correct this trouble.

At the November 4th meeting of the Two Meters and Down Club there was an extensive discussion of the 2-meter polarization question, with an eventual decision to change over to horizontal polarization by December 1st. This will be the first extensive use of horizontal on the West Coast. With the large number of stations involved, results should be of considerable interest. Their propagation problems are somewhat different from those of other sections of the country, in that many paths are worked by means of reflection from distant mountain ranges. There is also a greater percentage of mobile activity than in most other areas. If the W6s make out well with horizontal as a standard it should be successful in any section of the country.

Sacramento, Calif. — There are propagation peculiarities in the Sacramento Valley, too, says W6PIV. Ken reports that some stations only 50 miles to the south are heard only a small percentage of the time, whereas others 100 miles or more distant, with high intervening hills, are worked regularly with good signal strength.

A combination of 29.4-Mc. f.m. portables and 144-Mc. mobiles under direction of W6KME provided communication for the boat races on the Sacramento River on Oct. 30th, providing a good workout under conditions closely simulating those of emergency communication.

The World Above 420 Mc.

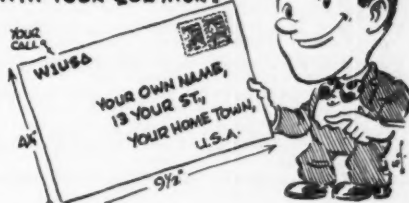
Interest in 420 Mc. in the region around Springfield, Mass., received quite a boost on Nov. 12th, when W1MEP and W1NH, operating from the summit of Mt. Greylock, in the northwest corner of the state, worked W1CCH in Springfield and heard W1AEP. Though Greylock is the highest point in Massachusetts, it is not line of sight into Springfield, and it used to be considered quite a feat to work Springfield stations from there on 5 meters in your conductor's mountain-climbing days, back in the early '30s.

W1MEP is also on 420 from his home location in Bennington, Vt., but up to now he has not been able to get out from that location, surrounded as it is by high hills. He works stations in Schenectady and Albany regularly on 144 Mc., and has conducted 420-Mc. tests with W2WFB while in contact on 144, but nothing has been heard either way as yet on 420. Chet uses a BC-788 with a square-corner reflector array.

There is considerable activity on 420 in northeastern Ohio, according to W8SR, of Alliance, who dropped in at Headquarters recently. He tells us the W8s VO, Akron, ODB, Alliance, OQE, Youngstown, MQW and NB, Barberton, are working out on 420 regularly.

By now it has been pretty well established that we can make some conventional tubes work in more-or-less conventional circuits on 420 Mc. They don't set the world on fire, but they do work. How then about the next higher band, 1200 Mc.? Some time ago we showed a 1200-Mc. oscillator built by W3HFW and W3MLN, using a 703-A tube in a line oscillator. W6CFL has been working with a set-up like this, but with inferior results to date. Up to now he's not been able to do more than light a 60-ma. pilot light, but he's still trying. Does anyone else have experience along this line?

IS YOURS ON FILE WITH YOUR QSL MGR?



A.R.R.L. QSL BUREAU

The ARRL maintains a QSL bureau system to make it easy for you to receive your DX QSL cards, but in order for it to function it is necessary that we receive your cooperation. All you have to do is send the QSL manager for your call area a stamped self-addressed envelope of the No. 10 stationer's size (No. 8 post-office size), with your name and address in the customary place and your call letters printed prominently in the upper left-hand corner. When he has an envelope full of cards for you, he'll return the envelope to you. Upon receipt of that envelope, be sure to send him another.

If you've previously held a different call, send an envelope to the manager for that call area. If you have been operating portable, remember that all QSLs for such operation are routed via the home district.

Do not send cards for other W or VE stations for distribution via the QSL bureau; they cannot be accepted. Likewise, do not send cards for distribution to foreign stations via this domestic QSL bureau system. For the addresses of the proper bureaus to which foreign cards may be sent, see page 61 of December, 1949, QST.

This QSL bureau handles only incoming DX QSLs.

- W1, K1 — Frederick W. Reynolds, W1JNX, 83 Needham St., Dedham, Mass.
- W2, K2 — Henry W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
- W3, K3 — Jesse Bieberman, W3KT, Box 34, Philadelphia, Penna.
- W4, K4 — Johnny Dortch, W4DDF, 1611 East Cahal Ave., Nashville, Tenn.
- W5, K5 — L. W. May, jr., W5AJG, 9428 Hobart St., Dallas 18, Texas
- W6, K6 — Horace R. Greer, W6TI, 414 Fairmount St., Oakland, Calif.
- W7, K7 — Mary Ann Tatro, W7FWR, 513 N. Central, Olympia, Wash.
- W8, K8 — William B. Davis, W8JNF, 4228 W. 217th St., Cleveland 16, Ohio
- W9, K9 — John F. Schneider, W9CFT, 311 W. Ross Ave., Wausau, Wis.
- W6, K0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minn.
- VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
- VE2 — Austin A. W. Smith, VE2UW, 6164 Jeanne Mance, Montreal 8, Que.
- VE3 — W. Bert Knowles, VE3QB, Lanark, Ont.
- VE4 — Len Cuff, VE4LC, 286 Rutland St., St. James, Man.
- VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
- VE6 — W. R. Savage, VE6EO, 329 15th St., North, Lethbridge, Alta.
- VE7 — H. R. Hough, VE7HR, 1785 Emerson St., Victoria, B. C.
- VE8 — Jack Spall, VE8AS, P. O. Box 268, Whitehorse, Y. T.
- KP4 — E. W. Mayer, KP4KD, P. O. Box 1061, San Juan, P. R.
- KZ5 — C.Z.A.R.A., Box 407, Balboa, Canal Zone
- KH6 — Andy H. Fuchikami, KH6BA, 2543 Namauu Dr., Honolulu, T. H.
- KL7 — J. W. McKinley, KL7CK, Box 1533, Juneau, Alaska

Military Amateur Radio System

Thousandth MARS Member Is Well-Known Test Pilot

MARS-Army is proud of its 1000th member.

Reaching the 1000 mark was a noteworthy event in the life of the fledgling organization, but it was the stature of the candidate which really made the buttons pop as MARS officials recorded and approved the application of Captain William V. Davis, jr., USN, A3OSM/W3OSM.

Captain Davis is director of flight test at the Naval Air Test Center, Patuxent River, Md. He has been a ham for 32 years and started aircraft radio operating in 1924.

On September 21, 1949, he received the "National Air Council Award for Naval Aviation Experimentation and Research for the Year Ending 30 June 1949." The presentation was made in Washington by Secretary of Defense Louis Johnson.



Thousandth MARS member, Captain William V. Davis, jr., USN, A3OSM/W3OSM (second from right), receives National Air Council award from Secretary of Defense Louis Johnson. Also shown are John Dwight Sullivan, NAC executive vice-president, and Captain Vincent Mazza, Air Force award winner.

Known to the public as the man who winds up the new jet buggies and puts them through their paces for the Navy, Captain Davis is also known in the ham fraternity for his contributions in the fields of antenna design and experimentation. He belongs to MARS, the ARRL, and the Naval Air Patuxent Ham Club (W3PQT).

Captain Davis operates 40 and 10 meters. He is on the air with an ART-13, power input 140-160 watts, A1 and A3 emission. His receiver line-up is three ARC-5s in cascade. He uses a cubicle quad on 10 and an off-center-fed on 40.

Captain Davis is a native of Savannah, Ga., a graduate of the Naval Academy (class of '24), and holder of the Distinguished Flying Cross and the Legion of Merit.

He participated in the Dole Air Races in 1927 and became the first Naval officer to reach the Hawaiian Islands from the mainland by air. During the late war he served with the staff, Commander Aircraft, Central Pacific Force, was deputy chief of staff for operations, Commander Shore-Based Air Force Forward Area, Central Pacific, and in 1945 was chief of staff, Headquarters Strategic Air Force, Pacific Ocean Areas.

What's in a name? MARS chiefs don't know, but it is true that the first MARS member was also named Davis — A4NGX/W4NGX. Also, both members are from the Second Army Area. The two amateurs are not related.



Correspondence From Members-

The Publishers of *QST* assume no responsibility for statements made herein by correspondents.

N.F.M.

Rural Radio Network, Inc., 118 North Tioga,
Ithaca, N. Y.

Editor, *QST*:

It is felt that most hams are missing the boat in not fully exploiting the field of narrow-band f.m. which has been fighting an uphill climb since some of the fraternity started using it. This because most of the gang were still trying to receive the n.f.m. signals on conventional a.m. receivers, without the aid of a simple converter. A look at some of the commercial n.f.m. systems might convince some of the "die-hards."

One of these 152-162 Mc. systems is in operation here. With a quarter-wave ground-plane antenna on the roof of a Jeep and 40 watts input, we work our control stations regularly over distances exceeding 125 miles. Remember, no directional antenna at either end. Also, the degree of quieting at the receiving end is a thing that can't be duplicated with normal a.m. equipment.

The reason for this type of reception is easy. Good "hot" ham converters and receivers on the market can boast anywhere from 3 to 1 microvolts sensitivity, for a 6-db. quieting of background noise. A look at the "specs" on most of the present day n.f.m. taxi two-way radio receivers will show a claimed sensitivity of under 0.4 microvolt for 19-20 db. quieting. It isn't difficult to imagine what a fellow could do with a receiver possessing this sensitivity, especially if he were out to set a DX record.

It requires anywhere from 12 to 16 tubes and usually a double-conversion circuit to attain this degree of reception, but the average ham with the average superhet equipped with an n.f.m. converter can get many of the advantages for himself.

So far we have talked reception. There are some equally good advantages in the transmitter end of n.f.m. It's possible to put 40 watts of transmitter complete from microphone phone plug to antenna connector on a 4 X 8-inch chassis, without the use of single transformer or choke.

Power requirements are practically the same for an n.f.m. as they are for a c.w. transmitter of equal power, cutting down the size of the power supply. Because of the almost complete lack of audio equipment involving transformers, etc., the saving in weight is sizable.

I'd like to suggest that more of the fellows build a simple two-tube n.f.m. converter, get it operating, and then after receiving some n.f.m. signals, I'm sure they will do the whole job, by converting the transmitter too. It would seem to be the duty of all the gang who are using n.f.m. at the moment, to encourage fellows to use converters, rather than continue to "tune off to one side." The recently-started practice of some set manufacturers of supplying matching n.f.m. adapters for their sets is laudable, and will help the cause a great deal.

I'd be interested in hearing from some of the rest of the fraternity on this subject.

— William B. Perkins, W8VEN

TEN C.W.

527 Bedford Ave., Brooklyn 11, N. Y.

Editor, *QST*:

I am trying to accomplish a good deed and at the same time have lots of fun. You see, for us fellows who live in the city and are surrounded by television "trees," the ten-meter band is a dead duck in the early evening. Although my rig

is literally TVI-proof, it is useless to try to convince my landlord, who has a TV set, that the cause of his interference is attributable to many other factors.

However, ten meters is still a swell band in the fact that not much antenna space is required, low-power equipment, etc. After 10 p.m. the band is still there for the asking. TV programs are just about over. It may be true that DX is not an easy find, although the writer did work a number of DX stations much after ten. But the real shame is that the ten-meter c.w. band is kept dead as a duck night. The writer is now doing his utmost to get a local group going on ten c.w. This will keep much QRM away from the other bands too. Thanks to such fellows as 2PAN, 2QHU, etc., a start is being made in this direction. For now hams this band will really give them plenty of c.w. practice as well as a chance to make friends with other local hams.

Come on, fellows, let's get the ten c.w. band going. And to the first W6 I work after dark on ten c.w. (after this letter appears) I will send a suitable souvenir.

— Gerald Samfajsky, W2YSF

QST

Vassar College, Poughkeepsie, N. Y.

Editor, *QST*:

I think you have done a good job in spreading the articles among the various subjects. Don't let anybody tell you that the technical articles are too technical. I succeeded in explaining an article about which there were complaints to a boy in the eighth grade. . . .

— Hardison J. Geer

VOL. I, NO. 1

195-08 42nd Ave., Flushing, N. Y.

Editor, *QST*:

Many hams like myself are making collections of *QST*. I have a pretty complete file from 1920 to date. However it is very hard to obtain issues prior to that. Here is my suggestion. Can the ARRL release copies of No. 1 issue of *QST*, say in photo-offset or some other method, and either sell the issue, or perhaps give it out with all renewals? Perhaps one copy could be issued each year or 6 months.

What do other hams think of the idea?

— Robert Cabaugh, W8DTE

AMATEUR FRIENDSHIPS

Box 919, Dhahran, Saudi Arabia

Editor, *QST*:

Every amateur makes countless friends over the air, some of them in faraway places that he would not expect to be able to visit. So I feel very fortunate in having been able to meet and to know in person amateurs in South and East Africa, and in Italy. They have shown true kindness and hospitality.

In Florence, Italy, I met an old friend whom I'd contacted from California and Africa, and had corresponded with — Dr. Grossi, or Lucky — IIKN. Besides visiting his station and talking about old times, we occupied many hours of his time as he helped Cobi and me through most of the paper work and translation involved in being married in Florence. She being from Holland, the OM from the U.S.A., and with neither of us knowing Italian there were numerous complications. Half the attendance at the wedding

(Continued on page 180)



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
JOHN E. CANN, WIRWS, Asst. Comm. Mgr., C.W.
GEORGE HART, WINJM, Natl. Emerg. Coordinator

J. A. MOSKEY, WIJMY, Deputy Comm. Mgr.
L. G. McCOY, WIICP, Asst. Comm. Mgr., Phone
LILLIAN M. SALTER, Administrative Aide

Mobiles Needed! Mobile operation is on the increase. We hope that every EC will put on a drive to make sure that every ham who has a mobile or car-installed rig of any description or frequency capability is asked to carry an Emergency Corps card. The ability to carry the communication to the spot needed is important, whether by means of "sets with handles" or mobile installations. Mobile capabilities offer a challenge to every amateur. However, dynamotors at giveaway prices have brought the problem of emergency power "as near as your car battery." The fun in taking amateur radio gear along on one's vacation has been compounded by the liberality of the FCC in extending our rules to permit mobile on all amateur band frequencies following request for this by the League's Board of Directors just a year or two ago. All amateurs in the process of planning and rebuilding are urged to give due thought to emergency power and mobility . . . the circumstances in which communication offers the most and radio alone can do the job in hand.

Club TVI and BCI Committees. Each radio club can give top service to its members by maintaining an active interference committee and centralizing a complete kit of typical high-pass and low-pass filters with availabilities of calibrated devices (such as converters, grid-dip meters and Little Gem type indicators) readily capable of showing transmitter or circuit conditions in the TV frequency ranges. If expedient the club treasury should support a program to make centralized stocking of such measuring devices possible. The committee of an odd number of members (5 or 7 usually suggested) should include one or two prominent TV-BC set owners, technically-skilled amateurs, and members keeping contact with the local press for necessary reports on the activity of the group. This makes a nicely balanced team for the public relations and amateur programs necessary. Technical talks and demonstrations of TVI reduction should be scheduled by the club interference committee and usually fit into the program committee's desires nicely. After an initial TVI committee study of the following suggested ARRL material, any additional copies that can be used may be requested of ARRL. Radio club committees are invited to write the Communica-

tions Department for one copy each of the following ARRL mimeographs: (1) Typical Solutions to BCI; (2) BC Interference, Sources and Remedies (ice-breaker stressing results from co-operation); (3) Television Reception and Interference (FCC 48-1803 General Information Release); (4) About Television Reception (TVI-ice-breaker, suggestions and facts for the TV-receiver owner); (5) TV Interference Remedies.

Collaboration with the U. S. Weather Bureau in Emergency. A recent conference with U. S. Weather Bureau personnel in Washington reviewed the progress of the arrangements instituted a few years ago for collaboration between amateur operators and weather observers in specific forecasting regions. Representatives of the Bureau were enthusiastic concerning the progress of some ten networks under appropriate ARRL regional coordinators. Besides approving the continuance of all such present facilities, the conferees examined the feasibility of calling on amateur networks shown in the Net Directory for the dissemination of emergency warnings and forecasts. In the event of failure of incoming and outgoing facilities from key areas that might be affected by unfavorable seasonal contingencies this might become important. At the conclusion of a two-day conference in which ARRL explained amateur operational potentialities, it was agreed that the weather data collecting and forecasting organization would inform its key points throughout the nation of recommended methods of emergency use of amateur radio. Likewise there will be issued through the League to its basic list of ARRL section officials and registered-net operating leaders, information on which collaboration in the national interest might be based should occasion for emergency communications arise.

DX Contest Note to All Foreign Amateurs. This is a plea . . . please state at all times where you are going to tune when you call CQ DX or QRZ?, but especially do this in the coming ARRL DX Contest! There are several ways to give your tuning plan. The new method of doing this is gaining in popularity. (1) CQ DX 75U de VK9ML 75U K (c.w. example) becomes "Answer 75 kilocycles up from my frequency, go ahead" when using voice. Some amateurs like a broader specification than 50U or 50D for 50 kc. up or

down. (2) There's the older ARRL procedure of "tuning HM, ML, LM, etc." (for high-to-middle-of-band, middle-to-low, or low-to-middle). (3) W2TXB writes, "If our DX fone operators would only state that they were going to tune the VE band, or from the bottom of the American band down, or the top of the American fone band up, then *all* the Ws would not call them and cause QRM to each other." Here is a simple way to reduce that QRM level!

Activities! We start the year with *plenty doing*. This QST carries the announcement of the V.H.F. Sweepstakes, a Ten-Meter (WAS) Party and a Frequency Measuring Contest, all for January. Advance information on the DX Contest is given to reach overseas points *before* the February-March test. Best of luck and good operating!

— F. E. H.

SO NOW YOU'RE CLASS A

From time to time one sees articles giving advice to prospective hams but I have yet to see anything written to help the holder of a Class A ticket. I contend there is a crying need for such advice, particularly in regard to 75 meters. If you doubt it just listen around for a while. After all, 75 is the band of nets and round tables; observance of proper procedures and courtesies is essential. With one wish of a VFO it is possible to QRM three nets, a round table and the neighbor's BC program, thus annoying upwards of one hundred people simultaneously. Some seasoned Class A operators have this technique down to a science.

Take the problem of breaking into a round table; there are several systems. One of the less popular is to tune up the final a few kc. off the frequency and then zero beat the VFO with the final dead. Just as one station is turning it over to the next, you break in with a quick short call. This system



will get you in the QSO without any trouble, but it will also mark you as a green operator. Nobody who is anybody uses this outmoded technique.

One of the preferred systems is to zero beat, then tune up the final on the frequency. This will let the members of the round table know that somebody wants in. They will probably take a stand-by for you on the next transmission. However, don't show your ignorance of 75-meter procedures by calling in when they stand by for you. Wait until the next man starts his transmission; then break in with a call. Always call the station that is making the transmission. Naturally he can't hear you while he is on, so won't answer. This gives you an excuse to call again in a few seconds. Keep calling until one of the other members of the round table acknowledges you. Once in a round table the idea is to keep others out. Be very quick on the switch when your turn

comes up, thus making it impossible to call in between transmissions. If someone does manage to get in, make him wait a full round before giving him a chance to talk.

Then there is the 'phone net procedure, which is quite different from c.w. net work. When you are new on 75 the best way to get on your section net is to listen to the roll call until you hear some friend of yours answer in. You immediately jump right in with all four feet and give him a long call. He will probably come back with a short snappy transmission and tell you to QRX. Stick around and every time that you hear a familiar call give him a blast on the net frequency. This is a good way to build up your reputation among the net members. They will be certain to remember your call. When you decide to report into your net regularly the best way is to call in on the stand-by period or when you are called on the roll. I know this will stifle your originality, but if you want to have any contacts with any of the other net members, you will have to put up with it.

Of course it goes without saying that the rig should be tuned on the net frequency, preferably after the roll has started. If you happen to be late, the proper thing to do is to wait until some traffic is being handled before you throw on the carrier and tune up. Wait a minute or two, then break in and say that you would have called in before but didn't think that you could get through the unmodulated carrier on the frequency. If you wish to make a schedule with some other member of the net, don't show your immaturity by telling the NCS when you check in. Just go ahead and call him — that much more QRM won't matter.

As for traffic, don't bother with putting your messages in regular form. That is just for the c.w. ops and greenhorns. By all means don't use a regular phonetic list for clarity. The more you can foul up your messages the more fun the other guys will have trying to decipher them.

In 'phone net procedure you do not turn it back to the net control when you have cleared your traffic with another station. Instead, you engage in a ragchew with the station you are in contact with. The trick is to make your conversation sound as if each transmission would be the last so that the net control won't QRM you. He will think you are going to sign any minute, but of course you drag it out as long as possible. When you can't keep this up any longer you come out with, "Say, is the net over? Maybe we better turn it back to net control and find out."

There are a thousand-and-one ways of annoying a net control. The naming of a few more favored ones will have to suffice: — Always run your before-net QSOs about a minute overtime. If your net has a good reliable control station make remarks to the other fellows about, "Certain people trying to hog the job." If the NCS is late or absent, get on the frequency and call loudly for net control. BUT, remember this, never, never, NEVER, accept the job of NCS yourself. It's just a sucker job, and anyhow your time is much too valuable.

The neophyte Class A operator is faced, upon completion of a modulator, with the problem of whether or not to continue his c.w. work. The pros and cons of c.w. for the Class A operator are beyond the scope of this article. There is no unanimity of opinion upon this subject among my acquaintances; however, a few words are in order.

The strictly 'phone man can speak in sneering terms about c.w. operators, implying that they haven't the brains to build a modulator. The one who continues on c.w. can casually mention his c.w. work with an air of self-righteous superiority implying the 100 per cent 'phone men are too muddle-minded ever to concentrate on a code speed above 10 words a minute. You can see from this that either course has its compensations. If you do choose to continue c.w. operation you can show your Class A originality even on the c.w. bands. Such tricks as having the weights on your bug set for a speed at least thirty per cent faster than you can send and applying aforementioned 'phone net tactics to c.w. will quickly build up your rep.

Now, my newly-weaned Class A Ham, you must decide. What kind of a Class A operator are you going to be? Are you going to muddle along with the old Class B habits, or are you going to be one of the boys? If you faithfully follow the rules set forth herein, you need have no doubts about the kind of reputation you will earn!

— Sidney L. Markusen, W8BGY

OCTOBER CD QSO PARTY

The number of whopping big scores listed in the tabulation below is a good indication of the degree of activity that prevailed in the October CD Party! It was a bang-up affair that gave CD appointees a fine opportunity to warm up for the November Sweepstakes.

Another CD Party is scheduled for the week end of January 28th-29th. Any holder of an ARRL appointment or office will be eligible to participate. If you're interested in organized operating activities, and do not already hold an appointment, look over the list of such appointments in the booklet *Operating an Amateur Radio Station* (sent gratis to League members upon request) or the *Handbook* and decide which suits your particular interest and qualifications. Then write to your SCM or League Headquarters for complete information on how to receive the appointment of your choosing.

Station	Scores	Contacts	Different Stations	Sections
W6WNI	840,632	337	217	57
W1EOB	831,720	471	291	57
W4KFC	765,260	454	274	58
W1JYH	730,380	440	273	56
W9BRD	719,875	436	265	60
W9RQM	710,600	434	263	60
W3HRD	660,440	413	263	53
W6ZAT	648,064	284	187	57
W2GFG	638,520	401	258	55
W8GBF	499,565	334	233	60
W3GRF	498,015	350	226	53
W7ZT	490,194	241	173	53
W4IA	478,055	320	236	57
W7KWC	477,990	226	179	56
W3GJY	466,640	300	244	60
W4BZE/4	424,320	307	219	53
W2CWX	415,800	309	213	51
W3LIW	408,965	311	214	49
W4KYD	390,600	304	201	51
W4LRI	390,150	306	202	53
W4NNJ	361,400	253	229	49
W9WEN	346,075	277	191	54
W9NH	345,630	275	190	56
W2KUS	334,620	286	189	45
W1LHE	331,540	298	192	50
W6BIP	322,361	194	124	57
W9DYX	317,200	255	188	56
W2NIY	312,390	261	186	48
W1QMJ	308,385	260	183	48
W7KGJ	306,528	162	162	44
W5NGN	305,830	251	185	53
VE3WY	303,260	250	184	52
W1CRW	292,740	246	182	56
W9CBE	292,365	260	171	48
W2ZVW	289,685	246	181	48
W4NJV	277,500	244	172	50
W6APG/6	269,600	147	147	53
W9DKV	265,825	210	210	35
W2KEL	264,000	235	173	47
W1AQE	261,485	217	193	48
W8ZJM	250,475	227	159	60

Others with scores over 150,000: W9DJV 249,900, W4ILE 246,240, W5TZO 245,310, W9UKT 241,755, W6VAQ 239,896, W3JHW 237,015, W8DAE 233,160, W8JM 231,650, W3BWL 224,770, W20BU 224,720, W8TAQ 222,760, W2VJN 221,625, W8ZAV 221,325, W1CJH 191,235, W1AW 209,880, W2LPJ 195,025, W6RFF 192,820, W1UHM 191,235, W9QLW 190,950, W8NOH 189,520, W6FQB 183,120, W4FF 174,800, W2PRE 165,120, VE2GM 164,900, W7OAP 160,020.

YL-OM CONTEST

What promises to be the most interesting contest yet sponsored by YLRL is the YL-OM Contest, in which all OMs are invited to participate. DATES: 'Phone, January 21-22, from 7 A.M. CST on the 21st to 12 P.M. CST on the 22nd, on 75, 20 and 10. C.W., January 28-29 as follows: 28,000-28,100 kc., 14,050-14,150 starting 7 A.M. CST on the 28th and ending 7 P.M. CST on the 29th; 3600-3700 kc., 7100-7200 kc., starting 7 P.M. CST on the 28th and ending 7 A.M. CST on the 29th. On 'phone call "CQ YL-OM

Contest," and exchange QSO number, time and location. On c.w. YLs call "CQ OM," OMs call "CQ YL," and exchange QSO number, time and location. SCORING. Count one point for each contact. Multiplier shall be each state, territory, country or VE province, but the multiplier shall count only once regardless of the bands operated. A contestant may operate any bands but must submit separate scores for 'phone or c.w. There will be prizes for both the YLs and OMs, so join the fun. To be eligible for prizes the YLs must be a member of YLRL, but all licensed OMs are eligible. Mail logs not later than February 5, 1950, to Anabel M. Gifford, W3NNS, 26 Waverly Ave., Morton, Penna.

DX CENTURY CLUB AWARDS

HONOR ROLL

W1FH	226	W3BES	214	W3GAU	209
W6VFR	223	W2BXA	213	W4BPD	206
G2PL	216	W8HGW	211	W9YXO	206
W6EBG	215			W6MEK	206

RADIOTELEPHONE

W1FH	183	W1JCK	158	W8HGW	155
W6DI	170	W4CYU	157	G2PL	155
XEIAC	168	V4ERR	157	W1NWO	152
		W2BXA	156		

From October 15 to November 15, 1949, DXCC certificates and endorsements based on postwar contacts with 100-or-more countries have been issued to the amateurs listed below.

NEW MEMBERS

G5RV	147	W6LV	104	W2ROM	101
LU3DH	144	W3IBT	104	W8FJX	101
G3FY	114	W6DYP	104	FE8AB	101
PA6VB	112	SM6HU	102	W5KUL	100
KH6PY	111	ZS6LW	102	W1FEG	100
W4LIM	111	VE1HG	102	G3ACC	100
W1CJF	108	VK5MF	101	W5GZ	100
W6LGD	108	KZ5IP	101	W8LYP	100
G3QD	106	W6KYT	101	W6ITH	100
W6BZE	105	W9BRD	101	W8RVU	100
W6BUD	105	W6NTR	101	I1AMU	100
W2WPJ	104	KZ5CP	101		

RADIOTELEPHONE

LU3DH	119	W3MAC	100	W4MKB	100
G5RV	111	W2IUV	100	W8FJX	100
W4LIM	108	I1AMU	100	W6ITH	100
VP6G	103			W4GLR	100

ENDORSEMENTS

W6SN	203	W2PUD	161	W1JLT	131
W1TW	201	W2AGO	161	W2RGV	131
W8NBK	194	W3DKT	160	W5JC	131
W2DS	190	G8KP	160	G6RC	131
ZL1HY	190	W8WZ	160	W2CSO	130
W1JYH	183	W9LNM	154	W4DHZ	130
W9RBL	182	W6PNQ	152	OK1SV	130
W6DI	181	W6CUQ	152	W1BLF	129
W2NSZ	181	HB9DO	150	W6EYR	121
VE3QD	180	W9CIA	150	G5FA	120
W2CYS	180	W8IBD	150	W5LGS	120
W6DZZ	176	W8UAS	150	W2GTP	120
ZL2CX	171	OK1FF	148	W6WWQ	114
W4PN	170	W5BGP	146	W2LTP	110
W6UCX	170	W2EMW	141	W6BIL	110
W2HML	164	W2TXB	141	W6TS	110
OK1LM	163	W2WZ	141	W8ERA	110
W6GFE	163	W9FKC	140	ZS1M	110

RADIOTELEPHONE

W5BGP	141	W4GMA	121	W2RGV	113
ZL1HY	132	W6TT	121	W4MRA	112
W7MBX	132	W4ESP	121	CN8BA	110



Since the service rendered by amateurs during emergencies is voluntary and without compensation, agencies served are usually enthusiastic in praise but reticent about offering any criticism. This is natural enough, since any other attitude might be something like "looking a gift horse in the mouth." However desirable this attitude might be, it has the possible danger of giving AEC groups the feeling that there is nothing to be desired in their set-up; whereas, in informal talks, it may come out that in one way or another the service could be improved upon.

One of the criticisms which have come out of such informal talks is duplication of messages and lack of authentication of reports and messages during emergencies. Emergency communication is often conducted under conditions of extreme chaos and confusion, and authentication is not always possible. An amateur mobile station will report from a disaster area that such-and-such a condition exists; since there is no civic official present, the report is often informal and a matter of the operator's opinion. Sometimes the operator's judgment is good, sometimes faulty — the officials outside the disaster area have no way of knowing. But if the information were signed by a known Red Cross or other civic official, there would be no hesitation about acting, no time-wasting attempts to find out from someone in authority what the real facts are.

What we are getting at is that wherever possible messages coming from within the disaster area asking for assistance should be signed by someone in authority. Such messages should be complete as to form and a copy kept at the originating station; and such messages should be sent to only one station on the outside. Where a "command" circuit is available and officials can converse with each other directly, the officials should be present and should do the talking, if this is possible; otherwise, record messages with authentic signatures should be handled. In emergencies, our primary job is to supply communications facilities. The contents of the communications themselves should come from someone else.

The possibility of duplication should be avoided if possible. Amateurs who hear an emergency message being sent should make a note of the contents but should not deliver the message unless it is being sent to them. Then, in the event the station it is being sent to is unable to receive it, it will be possible to receipt for it and offer to make delivery; but such delivery should not be effected without acknowledgment from the sending station. In the event circumstances appear to make it desirable to deliver the message without acknowledgment, it should be clearly stated in doing so that it was not sent to you and duplication from another source is probable. In general, this is a waste of somebody's valuable time and should be only a last resort measure.

It is incontestable that the important thing is to get the information through; also, that circumstances alter

cases, especially in emergencies, and no specific rules of conduct or procedure are possible. An operator operating a walkie-talkie in a snow storm cannot "file a copy" of a message he originates; neither can a transmitting station without a receiver transmit a call for help, specific or general, to a single station and hear the acknowledgment of receipt. We have to do what we can with the facilities we have, while in between emergencies striving for better facilities and more efficient operation of them. All we can say, since we have to be general, is that lack of authentication and duplication of messages are practices to be avoided — if possible.

From *Splatter*, the bulletin of the Minneapolis Radio Club, we glean that on Monday, October 10th, the club was contacted by the Minneapolis *Morning Tribune* with a request for windstorm damage from Rochester and northern Minnesota where normal communications facilities had failed. Quickly several available members were alerted and reports were soon flowing into the city desk. Due credit was received in a fine article in the Tuesday morning *Tribune*.

Napoleon, N. D., was cut off by a sleet storm last October 20th. An unidentified amateur in that town succeeded in contacting K9FAA, the amateur station at Mitchell Field, Milwaukee, while W9VSO was operating, stating that a party in Napoleon was expecting some urgent telegrams. W9VSO called W9ONY, the Western Union wire chief in Milwaukee, who traced the sought-after messages to Minneapolis, obtained them, gave them to K9FAA who relayed them by radio to the North Dakota amateur. The total time consumed in the transaction was about a half hour.

At the Indianapolis Fair last September, amateurs of the Indianapolis emergency group were instrumental in providing communication between the field stations and the Emergency Hospital set up at the fair grounds. Four set-ups were used, one at each of three field stations and one in the hospital, using 2-meter equipment owned by members of the group. The communications jobs consisted of calling ambulances, arranging relief shifts for the Red Cross workers, ordering supplies as needed and handling miscellaneous reports between the stations. Thirty-three amateurs stood 72 watches at the stations during the week that the Fair was in progress. The Red Cross was so pleased that they are considering a closer tie-in with the group for communications during emergencies.

The AEC group of Metropolitan Cincinnati has several times been called upon to furnish communications in directing parades, and they welcome it as an activity which will help to keep up interest. In November, they turned out to help with the annual Christmas parade, in which mobile stations furnished by W4KFV, W8YGH, W8DEU and W4NRA supplied communication between points along the parade. Mobiles were placed with Red Cross first-aid stations at the origin and ending point of the parade, and two additional mobiles patrolled and supplied communication from and to in-between points. Officials of parades of considerable length are very often in need of mobile communication facilities. It is a means of combining practice with service which might well be adopted by other groups.

Norwalk, Conn., was hit by a triple "disaster" last October 16th — a hurricane and a railroad wreck, followed by a flood. All this was part of the annual Simulated Emergency Test, in which the Norwalk AEC turned out in full force to man a station at the Red Cross chapter house and put several mobiles in the field. The cut shows part of the Red Cross station, W1SGZ, with W1QBO and W1PBH at the controls. "Operation Norwalk" was conducted under the direction of W1CTI, Norwalk EC, and W1DBM, chairman of the Red Cross disaster communications committee.



MEET THE SCMs

Lloyd E. Hopkins, W9EVJ, has been an active amateur since obtaining his first license in 1932.

In addition to his office as SCM of Illinois, Lloyd holds ORS, RM and Trunk Line Station appointments and is a member of the A-1 Operators Club. He holds a Public Service certificate for communications work during the Illinois-Iowa Blizzard of January, 1948. W9EVJ has participated in SS and DX Contests and has made the BPL many times. A member of the Elgin Amateur Radio Society, Lloyd is a past-president of that organization.



The layout at W9EVJ, which is located in a second-floor room, includes 24 ECO-46 buffer-pair 46s final, and 6L6-807 on 28-Mc. 'phone, in addition to a BC-348N receiver. Also on hand is a 50-Mc. 'phone portable.

Antennas in regular use are a half-wave center-fed on 3.5 and 7 Mc., and a dipole on 28 Mc. W9EVJ works mostly on 3.5 and 7 Mc.

Sports which Lloyd enjoys as a participant or spectator are baseball, handball, fishing, and football. His occupation is printing pressman for the Brethren Publishing House.

TRAFFIC TOPICS

In view of the fact that many amateurs are still reporting their traffic totals according to the old system, we think we should again point out that a new system for counting traffic was adopted on September 1, 1949, and traffic is now counted as *originated, received, relayed and delivered* instead of the former categories. Details in September, 1949, QST.

W6GMZ comes forth with the following: "Last night a message was relayed to me for a party in a near-by Nebraska town; I had received the message two nights before and had already made delivery! Several days ago a Colorado amateur sent me four messages for Chicago, which were promptly relayed; to my amazement, two days later those same four messages were sent to me by a W4 who said he had just received them from a W2!"

It is hard to tell what happens in these cases, but we all know that it should not happen. Observance of two simple rules by all concerned would do away with this useless and face-losing duplication: (1) send each message only once to one station; (2) do not undertake to relay or deliver a message unless it is sent to you.

Slow-speed nets are blossoming all over the place, many of them conducted by ARRL section officials in conjunction with regular section traffic activities. Some examples of these: Colorado, Connecticut, Georgia, Michigan, New York State (W.N.Y. and E.N.Y.), Oregon, Quebec, Kansas, Washington and Wisconsin. Most sections which do not operate slow-speed nets welcome slow-speed operators into their regular net and give them every consideration. ARRL's Trunk Line S was organized specifically for the slow-speed operator, and has many slow-speed connections along its route.

There is no longer any reason (if there ever was any) for operators who cannot maintain a fast code speed to refrain from handling traffic. W2PHO, in his fine "NYSS News," expresses a sentiment we like in replying to a prospective member of the net who says he cannot maintain a high speed, is a rank beginner, and cannot attend the net every night: "NYSS came on the air for the specific purpose of training beginners in traffic handling by having them actually do it under conditions suited to their operating ability. You are as welcome as the flowers in springtime, fella, and if you get paralysis of the wrist and suddenly forget that didad means A we'll cheerfully wait until you come out of it. As for attendance, there is no definite requirement; check in when you can, and as often as possible."

SUPPLEMENT TO NET DIRECTORY

This listing is to be added to the directory as published in November, 1949, QST, page 63. Another supplement will be published in March QST. Requests for changes or additions to be included in that listing should be sent to ARRL no later than January 15th. A complete mimeographed directory of nets registered up to November 15th is available upon request from the ARRL Communications Department; in addition to the alphabetical listing by name, this directory contains tabulations of nets according to frequency and alphabetically by states.

Name of Net	Freq.	Time	Days
Albert Phone Net	3765	2115 MST	Mon., Wed., Fri.
Badger Emergency Net	3950	1200 CST	Mon.-Sat.
British Columbia Net *	3655	1900 PST	Daily
		2200 PST	
Buzzards Roost Net	3930	1730 EST	Mon.-Fri.
Central Amateur Radio Club			
Net	7225	1900 CST	Daily
Colorado Slow Speed Net	3560	1730 MST	Mon.-Fri.
Delta 75 Phone Net	3905	0730 CST	Sun.
Eastern Penna. Net *	3610	1830 EST	Mon.-Fri.
Eleventh Regional Net (NTS)	3540	1945 MST	Mon.-Fri.
FARM Net	3935	2030 MST	Mon.-Fri.
Fifth Regional Net (NTS)	3645	1945 CST	Mon.-Fri.
		2115 CST	
First Regional Net (NTS) *	3610	1945 EST	Mon.-Fri.
		2115 EST	
Fourth Regional Net (NTS) *	3617	1945 EST	Mon.-Fri.
		2115 EST	
Gem Net (Idaho)	3743	2100 MST	Mon., Wed., Fri.
Georgia-South Carolina Net *	3525	1930 EST	Mon.-Fri.
		2130 EST	
Interstate Utility Net			
(Colo.) *	3540	1900 MST	Mon.-Fri.
Jersey Net	3630	2100 EST	Mon.-Fri.
Kentucky Net *	3600	0900 CST	Sun.
		1900 EST	Mon.-Sat.
Lake Erie Network	29,000	2130 EST	Sun.
Magnolia Net (Miss.)	3870	2100 CST	Wed.
Manitoba Phone Net	3805	1900 CST	Daily
Minnesota Phone Net	3960	1235 CST	Mon.-Sat.
		1800 CST	Mon.-Sat.
		0900 CST	Sun.
Mission Trail Net	3804	1030 PST	Daily
	3854	1900 PST	Daily
Missouri Emergency Net *	3905	1930 CST	Mon., Wed., Fri.
Missouri Traffic Net	3755	1900 CST	Mon.-Fri.
Montana State Net	3520	2030 MST	Sun., Tue., Thu.
Mountain Area Net (NTS) *	7190	2030 MST	Mon.-Fri.
Nebraska 75 Meter Net	3983	1230 CST	Mon.-Sat.
		2000 CST	Tue., Thu.
Nevada State Net	3660	1915 PST	Mon.-Fri.
New Hampshire Traffic Net	3685	1900 EST	Mon.-Fri.
New Jersey 75 Meter Phone			
Net	3900	0900 EST	Sun.
New Mexico CW Net	3705	1900 MST	Mon.-Fri.
New Mexico Emergency Net	7266	0900 MST	Sec. Sun. ea. mo.
New Mexico 75 Meter Phone			
Net	3885	0730 MST	Sun.
NYC-LI Emergency Net	3600	2000 EST	Fri.
NYC-LI Traffic Net *	3710	1900 EST	Mon.-Fri.
		2200 EST	
Ninth Regional Net (NTS)	3565	1945 CST	Mon.-Fri.
		2115 CST	
North Carolina Net	3605	1900 EST	Mon.-Fri.
		2200 EST	
Northern Emergency Net	3700	1145 EST	Sun.
Ohio Buckeye Net	3730	1900 EST	Mon.-Fri.
Ohio Emergency Corps	3725	1930 EST	Mon.
Oklahoma Phone Emergency			
Net	3860	0800 CST	Sun.
Oklahoma Traffic Net *	3682.5	1900 CST	Mon.-Sat.
Ontario 40 Meter Net	7267	1930 EST	Daily
Oregon Slow Speed Net	3585	1900 PST	Mon.-Fri.
		2000 PST	
		2100 PST	
Pacific Area Net (NTS)	3670	2030 PST	Mon.-Fri.
	7207.5		

Pelican Net.....	3870	0645 CST	Wed.
Pineapple Net *	3725	2000 HST	Mon., Wed., Fri.
Pioneer Net.....	3725	1900 PST	Mon.-Fri.
Polecat Net.....	3665	1130 EST	Sun.
Quebec Emergency Net.....	3570	1030 EST	Sun.
Quebec Net *	3570	1900 EST	Mon.-Fri.
		2200 EST	
Quebec Slow Speed Net.....	3570	2000 EST	Mon.-Fri.
Kansas Net.....	3610	1845 CST	Mon., Wed., Fri.
Kansas Slow Speed Net.....	3610	1845 CST	Tue., Thu.
Rebel Net.....	3635	1900 CST	Mon.-Fri.
Rochester Emergency Net.....	3860	2000 EST	Mon.
	3740		
	7250		
	144,130		
Sacramento Valley Emergency Net.....	146,500	2030 PST	Thu.
Sacramento Valley Section			
Traffic Net.....	29,400	1900 PST	Daily
San Diego Emergency Net.....	29,500	2000 PST	Tue.
Sea Gull Net.....	3961	1700 EST	Mon.-Fri.
Second Regional Net (NTS).....	3575	1945 EST	Mon.-Fri.
		2115 EST	
Seventh Regional Net (NTS).....	3575	1945 PST	Mon.-Fri.
		2115 PST	
Sixth Regional Net (NTS).....	3735	1945 PST	Mon.-Fri.
		2115 PST	
South Carolina Amateur Net.....	3940	1930 EST	Mon.-Fri.
South Carolina Phone Net.....	3935	1930 EST	Wed.
		1000 EST	Sun.
		1530 EST	Sun.
Southern Border Net *.....	3550	2030 PST	Mon.-Fri.
Southern New Jersey Net *.....	3700	1900 EST	Mon., Wed., Fri.
Southern Texas Emergency Net			
(CW).....	3940	2030 CST	Mon.
(PHONE).....	3860	1830 CST	Mon.
(Zone 1).....	3860	0700 CST	Sat.
(Zone 2).....	3860	1830 CST	Thu.
(Zone 3).....	3860	1830 CST	Wed.
(Zone 4).....	3860	0700 CST	Mon.
Swansee Net (W. Fla.).....	3595	1930 CST	Mon.-Fri.
Tar Heel Phone Net (N. C.).....	3865	1930 EST	Mon.-Fri.
Tenth Regional Net (NTS).....	3735	1945 CST	Mon.-Fri.
		2115 CST	
Third Regional Net (NTS).....	3590	1945 CST	Mon.-Fri.
		2115 CST	
Transcontinental Independent Net.....	7285	2030 PST	Daily
Transcontinental Phone Net.....	3970	Various	Daily
Trunk Line C.....	3790	2100 EST	Mon.-Fri.
	3775		
Trunk Line J.....	3565	1945 CST	Mon.-Fri.
Twelfth Regional Net (NTS).....	3540	1945 MST	Mon.-Fri.
Union County AEC Net (N. J.).....	144,700	2100 EST	Tue.
Valley Net (Calif.).....	29,280	2000 PST	Mon., Wed., Fri.
	3775	1915 PST	Mon.-Fri.
		2200 PST	
Vermont Net.....	3740	1900 EST	Mon.-Fri.
Vermont Phone Net.....	3860	0930 EST	Sun.
		1800 EST	Tue., Thu.
Virginia Net *	3690	1900 EST	Mon.-Fri.
		2200 EST	
Wash. Amateur Radio Traffic System.....	3970	1830 PST	Daily
Wash. CW Net (Slow Speed) *	3685	1830 PST	Mon.-Fri.
West Virginia Phone Net.....	3890	1900 EST	Mon.-Fri.
Western Mass. Net *.....	3725	1900 EST	Mon.-Fri.
		2200 EST	
Western Mass. 10 Meter Phone Net.....	29,250	2100 EST	Thu.
Western Penna. Traffic Net.....	3750	1900 EST	Mon.-Fri.
Wisconsin Net.....	3775	1900 EST	Mon.-Fri.
		2200 EST	
		1830 EST	
(Slow Speed)			
York Amateur Emergency Corps.....	144,138	2200 EST	2nd & 4th Mon.

* Change from previous listing.



Here is another of the West Coast's top traffic performers: W6CE. With this unpretentious set-up, Tim has racked up traffic totals well in excess of BPL requirements for eleven successive months and is a cinch to be 100 per cent BPL for 1949. He is ORS and RM, manager of the Sixth Regional Net of NTS, holds 35-w.p.m. code proficiency certificate and is a member of the A-1 Operator's Club. The rig is home built, a 6AG7-6AG7-4D32 combination running 150 watts input.

BRASS POUNDERS LEAGUE

Winners of BPL Certificates for October traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
W6CE.....	60	1141	1083	16	2300
W7CZY.....	72	927	867	30	1896
W2TYU.....	24	825	741	61	1651
W4PL.....	6	778	737	24	1545
W1AW.....	24	628	256	262	1270
W8NOH.....	14	578	458	100	1150
KG6DI.....	178	364	206	154	902
W5GZU.....	3	381	312	24	720
W7CKT.....	0	351	349	2	702
W1NJM.....	26	328	79	245	678
W5DRW ***.....	4	330	325	0	659
W9ESJ.....	36	308	231	72	642
W9EBX.....	4	312	312	10	638
W2JYR.....	87	315	212	0	614
W1QJM **.....	10	296	271	36	613
W4LNN.....	17	312	284	15	608
W2PRE.....	29	286	235	27	577
W2OBU.....	472	27	10	13	522
W2RUF.....	38	36	334	108	516
W5 RJ.....	413	169	124	10	516
W2CLL.....	34	231	231	16	512
W6BXN *.....	507	2	0	2	511

The following made the BPL for deliveries:

W1BDI 205	W6DDE 69	W8SCW 53
W1RWS 155	W5LSN 66	W2TYC 52
W6YLZ 104	W7FLX 65	W1QIS 51
W5MN 88	W7ZU 61	W1FTX 50
W1DAV 86	W3CUL 59	
W5DRW 73	W6FDR 57	

A message total of 500 or more or 50 or more deliveries will put you in line for a place in the BPL. The Brass Pounders League is open to all operators who qualify for this monthly listing.

* August Traffic

** September Traffic

*** April Traffic

FREQUENCY-MEASURING TEST, FEBRUARY 6TH

All amateurs are invited to try their hand at frequency measuring. WIAW will transmit signals for the purpose of frequency measurement starting at 9:30 p.m. EST (6:30 p.m. PST), Monday, February 6th. The signals will consist of dashes interspersed with station identification. These will follow a general message sent to help listeners to locate the signals before the measurement transmission starts. The approximate frequencies used will be 3509, 7267 and 14,179 kc. About 4½ minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 9:36 p.m. It is suggested that frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At 12:30 a.m. EST, February 7th (9:30 p.m. PST, February 6th), WIAW will transmit a second series of signals for the Frequency-Measuring Test. Approximate frequencies used will be 3589, 7056 and 14,101 kc.

Individual reports on results will be sent to all amateurs who take part and submit results. Copies of this report are sent SCMs also, so eligibility for OO appointments is known. When the average accuracy reported shows error of less than 71.43 parts per million, or falls between limits of 71.43 and 357.15 parts per million, the participants will become eligible for appointment by SCMs as Class I or Class II official observers, respectively.

This ARRL Frequency-Measuring Test will be used to aid qualification of ARRL members as Class I and Class II observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the above-stated minimum required accuracy for these classes of appointment. Class I and Class II OOs must participate in at least two Frequency-Measuring Tests each year to hold such appointments. SCMs (see address, page 6) are open for initial applications for Class III and IV observer posts, good receiving equipment for 'phone and c.w. bands being the main requirement. All observers must make use of the cooperative notice (mail) forms provided by ARRL, reporting activity monthly through SCMs, to warrant continued holding of official observer appointment.

QST To Report Results

Any amateur may submit frequency measurements on one or all frequencies listed above. No entry consisting of a single measurement will be considered eligible for the QST listing of the top results in this FMT; at least two readings and preferably more should be submitted to warrant QST mention. Order of listing will be based on the over-all average accuracy, as compared with readings submitted by an independent professional frequency-measuring organization.

A.R.R.L. ACTIVITIES CALENDAR

Jan. 7th: CP Qualifying Run — W6OWP
Jan. 7th-8th, 14th-18th: 10-Meter WAS Party
Jan. 19th: CP Qualifying Run — WIAW, W9TQD
Jan. 21st-22nd: V.H.F. Sweepstakes
Jan. 29th-30th: CD QSO Party
Feb. 3rd: CP Qualifying Run — W6OWP
Feb. 10th-13th: DX Competition (c.w.)
Feb. 13th: CP Qualifying Run — WIAW, W9TQD
Feb. 17th-20th: DX Competition ('phone)
Mar. 8th: CP Qualifying Run — W6OWP
Mar. 10th-13th: DX Competition (c.w.)
Mar. 17th-20th: DX Competition ('phone)
Mar. 17th: CP Qualifying Run
April 1st: CP Qualifying Run — W6OWP
April 19th: CP Qualifying Run — WIAW, W9TQD
April 22nd-23rd: CD QSO Party
May 5th: CP Qualifying Run — W6OWP
May 16th: CP Qualifying Run — WIAW, W9TQD
June 3rd: V.H.F. Contest
June 24th-25th: ARRL Field Day

WIAW OPERATING SCHEDULE

(All Times Given Are Eastern Standard Time)

Operating-Visiting Hours:

Monday through Friday: 1130-0600 (following day)
Saturday: 1900-0230 (Sunday)
Sunday: 1600-2200

General Operation: Refer to page 64, September, 1949, QST, for a chart showing WIAW general operation. This schedule is still in effect and is not reproduced herewith for space considerations. Mimeographed complete master schedules of all WIAW operation in EST, CST, MST, PST or GCT are available upon request.

On Saturdays and Sundays during which official ARRL activities are being conducted, WIAW will forego general-contact schedules in favor of participation in the activity concerned.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies:

C.W. — 1887, 3555, 7215, 14,100, 28,060, 52,000, 146,000 kc.
'Phone — 1887, 3950, 14,280, 29,000, 52,000, 146,000 kc.

Times:

Sunday through Friday, 2000 by c.w., 2100 by 'phone.
Monday through Saturday, 2330 by 'phone, 2400 by c.w.

Code-Proficiency Program: Practice transmissions are made on the above-listed c.w. frequencies, starting at 2130, Monday through Friday. Speeds are 9, 12, 18, 25 and 35 w.p.m. on Monday, Wednesday and Friday, and 15, 20, 25, 30 and 35 w.p.m. on Tuesday and Thursday. Approximately ten minutes of practice is given at each speed. Next certificate qualifying run from WIAW and W9TQD is scheduled for Jan. 19th; from W6OWP, Jan. 7th.

The station staff:

T. F. McMullen, W1QVF, "fm"
R. N. Eidel, W1RUP, "re"
R. E. Morrison, W1RXL, "lr"

CODE-PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from WIAW/W9TQD will be made on January 19th at 2130 EST. Identical texts will be sent simultaneously by automatic transmitters. Frequencies of transmission from WIAW will be 1887, 3555, 7215, 14,100, 28,060, 52,000 and 146,000 kc. W9TQD will transmit on 3534 kc. The next qualifying run from W6OWP only will be transmitted on January 7th at 2100 PST on 3590 and 7248 kc. For additional qualifying-run dates, see the ARRL Activities Calendar elsewhere in these pages.

Any person may apply; neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the five speeds transmitted, 15 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from WIAW each evening, Monday through Friday, at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy.

Date Subject of Practice Text from November QST

Jan. 4th: The "Selectoject," p. 11
Jan. 6th: The "Selectoject," p. 14
Jan. 7th: Qualifying Run, 2100 PST, from W6OWP only
Jan. 10th: Break-In with One Antenna, p. 18
Jan. 12th: Harmonic Reduction . . . p. 21
Jan. 16th: Harmonic Reduction . . . p. 26
Jan. 18th: The Regenerative Wavemeter, p. 29
Jan. 19th: Qualifying Run, 2130 EST, WIAW/W9TQD
Jan. 24th: The "City Slicker" Array for 144 Mc., p. 32
Jan. 27th: The Story of FP8AA, p. 35
Jan. 30th: A 76-and-80-Meter Single-Sideband Exciter, p. 40

Buy Christmas Seals

(Number one hundred eighty-nine of a series)



Help Stamp Out TB

Merry Christmas

and

Happy New Year

from NATIONAL COMPANYY

C. L. Gagnebin.....	W1ATD	Richard Thurston.....	W1MFZ
Herman Bradley.....	W1BAQ	Victor Penney.....	W1MTS
Lawrence Amann.....	W1BG	Donald Poulin.....	W1MXC
James Ciarlone.....	W1BHW	Dexter Atkinson.....	W1MYH
Calvin Hadlock.....	W1CTW	Martin Oxman.....	W1NYU
Harvey Poore.....	W1DKM	Ralph Hawkins.....	W1OEX
Seth Card.....	W1DRO	John Prusak.....	W1OPT
Albert Porter.....	W1ESI	Austin Banks.....	W1ORK
J. Francis Bartlett.....	W1EU	William McNamara...	W1OTK
William Osborne.....	W1EXR	William Bartell.....	W1PIJ
George R. Ringland...	W1EYZ	Charles Coyle.....	W1PME
Don Hinds.....	W1FRZ	Harry Paul.....	W1PMS
Robert Murray.....	W1FSN	Richard Brayley.....	W1PRZ
Dave Smith.....	W1HOH	Hyman Kana.....	W1PSJ
John Baxter.....	W1HRK	George Servente.....	W1PWG
Vincent Messina.....	W1HRW	Raymond Jordan.....	W1QIU
Jack Ivers.....	W1HSV	Harry Mayo.....	W1QPQ
Joe Rossi.....	W1HXY	S. W. Bateman.....	W1RX
Edmund Harrington...	W1JEL	Clark Rodimon.....	W1SZ
Alfred Zerega.....	W1JMK	William S. Doyle.....	W1TV
Robert Williams.....	W1JOX	Edward Braddock....	W2BAY
Frank Lopez.....	W1KPB	Arthur H. Lynch.....	W4DKJ
William Martin.....	W1KUB	Raymond Lewis.....	W4JUJ
Richard Gentry.....	W1LEN	M. B. Patterson.....	W5CI
John Stanley.....	W1LFF	Ralph Hemeon.....	W6CYJ
Leo Green.....	W1LML	Herb Becker.....	W6QD
Francis Waden.....	W1LNV	W. Clif McCloud.....	W0AZT
Clyde Schryver.....	W0RPE		

★ It is a privilege to reproduce the 1949 Christmas Seal of the National Tuberculosis Society as a token of our contribution



ADVERTISEMENT

Station Activities

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Jerry Mathis, W3BES—QV is on 3.5 and 3.85 Mc. working traffic. PDJ is on 28-Mc. phone and 7-Mc. c.w. with a pair of 807s. NNV points out that the local lads are getting into the bad habit of omitting the "W" from their calls. QLW was on the air from the Wayne County Industrial and Hobby Show Oct. 19th to 22nd. Seventy-five messages were originated by MLW, QQC, CFD, QXY, KBV, and QLW. KBV had a display of old tubes and radio gear and a BC-654A. The ARRL supplied a display also. GDI's rig blew up during the CD Party. SQ is having a good time on 14-Mc. phone using his Spanish on our South-of-the-Border neighbors. SQ also served as contact man for the Ecuadorian Goodwill Flight and was thanked by the Ambassador for his fine work. GHM now has a ten-twenty beam and separate doublets for 3.5 and 7 Mc. LTU has worked 181 countries on 'phone. CFV has new 310B Collins. BXE/FP8AA is being snowed under with inquiries concerning his trip to St. Pierre. What has happened to all the reports from radio club secretaries? Not one has been received by the SCM in several months. Let us hear from the various clubs about their activities and programs. Traffic: W3CUL 424, PMG 113, QLW 75, EAN 52, ELI 20, OML 20, AXA 17, WTS 16, PDJ 14, GDI 4, EU 2.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, Eppa W. Darne, W3BWT—The Chesapeake Amateur Radio Club had a "Symposium on Receiver Circuits" at its first October meeting. Members were invited to submit their problems to a Board consisting of NVL, AFM, and LFF as moderator. LXX described and demonstrated a simplified f.m. exciter at the second October meeting. A Hidden Transmitter Hunt was held Oct. 30th with prizes for the first three winners. The club soon will begin publication of its new monthly journal, *Chesapeake Panorama*. The Washington Radio Club at its first October meeting featured a talk by 40LL, his subject being "Practical Use of S.S.S.C. on the Amateur Bands." Articles of Incorporation were presented at the meeting by Fred Albertson, FMC, for approval of the membership. The second October meeting was a Movie Night. Members of the Potomac-Rappahannock Valley Net had a meeting on Oct. 16th at Front Royal, Va., which included luncheon, a business session, gabfest, and a trip through the New River Gorge Power Plant. The net resumed regular formal drills on Nov. 6th at 9:00 a.m. Frequency used is 3935 kc. and drills are held on the first and third Sundays of each month, coincident with the 144-Mc. group. The Rock Creek Amateur Radio Assn. had a representative of the FCC as guest speaker at its Oct. 14th meeting. An auction of spare gear was held during the second October meeting. During the month the Club had a booth at a local exhibit. Ham apparatus was demonstrated and 200 messages were handled for the public in attendance. The Baltimore Amateur Radio Communications Society has a new entertainment committee, headed by PSP, and a program committee with JCL as chairman. Present club plans include further development of Control Station at Red Cross Headquarters, mobile drills, an aggressive membership campaign, and continued publication of the Club's paper, the *Modulator*. Field Day committee chairman is HJY, and membership committee chairman is LUE. EQK was visited by ZPL, recently. EOY is on 28 Mc. and has moved to his new QTH. OMR has 300-watt rig on 3.5, 7, and 14 Mc., c.w. and 'phone. PAW is a new Baltimore station. GBB is converting a BC-457 to mobile VFO. IBX entertained 6MNH over a recent week end. JCU gets out well with his revamped rig and a three-element beam on 28 Mc. QL has a new rig on the air. LFF and FLG are collaborating on a new 28-Mc. mobile receiver. PRJ is on 7 and 14 Mc. on the latter frequency has a 522 transmitter and a Silver 800 receiver, and uses a five-element rotary beam. PLC has a new gamma match beam. PFF is on regularly despite night school. UF is very active handling traffic on 7 Mc. GRF is active on 14 Mc. and made a swell

score in recent CD Party. NST has new QTH across the street from NNX. JZY has moved to Smithsburg, Md. NNX is on 27- and 28-Mc. mobile. LFG is building a crystal-controlled transmitter for 420 Mc. EYX visited Hyde Park, N. Y., and worked mobile 28 Mc. while on the trip. The Capitol Suburban Radio Club gives public thanks to CG for all his fine work for the Club and wishes him luck at the new QTH, Long Beach, Calif. Traffic: W3UF 445, ECP 171, LFG 77, AKB 35, JHW 24, NNX 20, FWP 10, BWT 8, QL 8.

SOUTHERN NEW JERSEY—SCM, Dr. Luther M. Mkitarian, W2ASG—BEI keeps daily schedules with G6BY and G3HZ. ZI has lost his antenna. BAY keeps very busy with twins. YAD has obtained his WAC. WJE is new ham in Ocean City. VUM, YAD, BLR, WJE, and UKS are active on 160 meters. IMA is doing FB EC work with local Fire Department. PFT and ORS keep daily schedule with K2USA. Secretaries of clubs in this section, please contact your SCM for visitation arrangements and send in all the news. Traffic: W2ORS 20, ASG 5, BEI 4, ZI 2.

WESTERN NEW YORK—SCM, Harding A. Clark, W2PGT—SEC: SJV, RM: RUF. Again the hams in this section proved that they are ready for an emergency by the very excellent showing they made in the recent Simulated Emergency Test. However, we still need AEG members in several localities. Write SJV today for an application. WZQ says motorcycle school and the YLs are causing him to be inactive on the air. FE is rebuilding his shack. The Ladies Auxiliary of RARA held a meeting with 30 attending and elected the XYLs of TEX, UTH, and NES officers in the usual order. The NYS Net collected results on senatorial election and forwarded them to party headquarters in New York City. QNA is back on 144 and 50 Mc. New officers of the Niagara Falls Radio Club are RGO, pres.; OVP, vice-pres.; and RCK, secy.-treas. ZDW has new 32-ft. steel tower for his beam. ZGS is having good success with n.f.m. on 28 Mc. SZL has been busy de-TVing new kw. rig. QY works early morning DX on 7 Mc. There are 24 stations using mobile in the Rochester area. 6ZJY is a newcomer to Rochester. BCL, UXF, ZHB, UAD, and NES all use 6J6 pre-amplifier on 144 Mc. with reception much improved. PGT has moved to 42-acre antenna farm. Please send activity reports to R.F.D. 2, Manlius, or to 814 State Tower Bldg., Syracuse, in the future. RUF is back in the habit of making BPL each month. PWN has been appointed Class I and III OO. Traffic: (Oct.) W2RUF 516, YGW 139, PGT 133, WOE 115, SJV 85, RUT 39, QHH 37, AOR 33, FE 23, YRF 8. (Sept.) W2WZQ 66.

WESTERN PENNSYLVANIA—SCM, Ernest J. Hlinsky, W3KWL—Well, gang, you have again shown them all in the recent National Simulated Emergency Test. In my opinion it was the best showing ever put out in any simulated or real emergency by the Western Pennsylvania gang. Congratulations to all of you for a job well done. Special recognition goes to MPO, Section Emergency Coordinator; OMA, Pittsburgh Area EC; MBB, Blair County EC; QN, of Erie County, along with TFX for his fine publicity; QCN, Mercer County EC; and all other ECs who took part. Up Warren way EMY, NQA, LEV, and BOZ can be heard on 28-Mc. mobile. OMK is a proud papa. RMM has a new summer cottage. In Mercer County the MCRA elected KQA, pres.; CJB, vice-pres.; Bonnie Massey, secy.; and George Heim, treas. Mr. Heim, completely blind, is head of the Blind Association in Mercer County and takes his radio club quite seriously. The Western Pennsylvania traffic net is going full swing. POW and NRE are new ORS appointees. GEG is taking his traffic nets in stride. Besides being manager of the 3rd Regional Net he reports or runs in five other nets. In Altoona the boys are chewing each other's ears to keep each other from working DX. The ATA of Pittsburgh announces that A. L. Budlong, of ARRL, now is an honorary member of that club. The Fort Necessity Open House was a huge success. RUC has deserted c.w. for 'phone. The South Hills Brass Pounders & Modulators 28-Mc. Ground Wave Contest showed lots of activity. The Old Polecat Net of Pittsburgh is operating again on Sundays at 1:30 a.m. on 3665 kc. LMM makes his first report in many a year. LOD reports that McKean County had a successful emergency drill. PAB is toying with Clapp VFO. State College reports the following new members: FWH, LDL, KCV, NSJ, KGX, and PQJ. MOT's new pole was up one day when the wind blew it down. BWL is studying Diesel Engines. NCJ says local QRN keeps him from traffic schedules. Traffic: (Oct.) W3GEG 281, KWL 183, NUG 81, NRE 20, KSR 18, NCD 17, LIW 16, LMM 12, POW 7, BWL 6, IYR 6, NCJ 6, LOD 5, PAB 3. (Sept.) W3GEG 35.

(Continued on page 72)

There is no more useful
and dependable instrument made

ONLY \$37.50 AT YOUR DISTRIBUTOR

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

Triplett

TRIPLETT ELECTRICAL INSTRUMENT CO. - BLUFFTON, OHIO, U.S.A.

Model 630

CENTRAL DIVISION

ILLINOIS — SCM, Lloyd E. Hopkins, W9EVJ — Section nets: IEN, 3940 kc.; ILN, 3765 kc. SEC: QLZ. PAM: UQT. RMS: SKL, SYZ. Activity hit a new high this month in all phases of the section program. BON is the first OBS appointee in the State. New OBS are CMU and JNC. FRP now is Assistant EC for Kane County. BRX says the local club is looking for 2-kw motor generator. FHV is new on ILN. The Kishwaukee Radio Club's new officers are TWM, pres.; WTF, vice-pres.; ULL, secy.; and Mr. Green, treas. HMM has new RME-45 and VHF-152. TWM sports a new Collins 75A. OVE still is on the air in spite of getting married. WCD has a Lazy H antenna 80 feet high. DNV set up with new 10-meter beam and TBS-50. SIU is exploring 3.85-Mc. 'phone for the first time. WTF went for higher power on 28 Mc. EVJ visited hams in Evanston, Decatur, and Springfield. And informs us of the death of JEA, who was assistant fire chief at Freeport. AUU is the father of a baby boy. The Sangamon Valley Radio Club "Keeper of the Pot" ceremony found KCX turning things over to ISG in hilarious fashion. JMG reports cold weather drove him from the garage to the kitchen for his operating. DUW was active during the Simulated Emergency Test with almost 20 members participating. NN was kept QRL installing co-ax fittings in new house. GDI found the CD Party lots of fun. FFD found DX such as DL, ZL3, Z86, Z85, G2, and G3. PHE had a swell contact with DL4DE for 2 1/2 hours using Collins 30K. ODT is working 14 and 28 Mc. GFF bought a house in the sticks. MFY is out for 7-Mc. mobile WAS. BUD works 28-Mc. c.w. DX on week ends. YES can't find his invisible antenna. RJM seeks DX on 7, 14, and 28 Mc. IZ pushes through on 28-Mc. n.f.m. Ex-9K10 now is 3OSP. TO was heard on 'PHONE. DVH sports new high power on 14 Mc. AEH busily defended his VK-ZL Test championship. 8YNY and BUOX visited BRD. JUV is attending Lawrence College in Wisconsin. YTZ is gunning for 7-Mc. DX. JKL left 28 for 7 Mc. ZWM is trying 3.5-Mc. c.w. ZEN works DX on 28 Mc. over week ends. CDG delivers messages at your door with mail job. TJC is using low power on 28-Mc. 'phone feeding a mile of wire. QLZ worked DAX, who was passing over in his plane. YNE is back at work after an illness. The Starved Rock Radio Club celebration featured a visit by 1DX, of Headquarters. CXT is now a lieutenant jr. grade. ATA is working such stuff as Z8, G, OA, and VP. TAY is building a new home. YBY is making a good showing on 144 Mc. IDA reports 127 contacts during the month. CTZ worked a Q on 3.5-Mc. c.w. New 90 stations are EHS and ZPC. New OBS appointees are ACU and KCX. YPS finds time to report into ILN. SYZ is operating each Friday night from IIZ, Chicago Coast Guard station. Nearly half of our counties are now represented by an EC. How about the rest of them? Contact QLZ if you can act for the hams in your area. We are shooting for 100 per cent coverage in our State. Illinois ECs made a good showing in the Simulated Emergency Test and we thank them. Traffic: (Oct.) WOBX 638, IDA 348, EVJ 338, CTZ 212, CMC 102, MRQ 68, CBA 67, JMG 29, PEK 25, FRP 24, CMU 23, FFD 19, IFA 18, LIN 17, FKI 16, ZPC 15, BUK 14, SYZ 12, NN 9, GDI 4, FHV 1. (Sept.) WBRD 27, DUA 10.

INDIANA — SCM, W. E. Monigan, W9RE — GHK now has all-band antenna, and is ORS and an AEC member. CVN bought Signal Shifter kit. GFO has the 160-meter fever. AZU is on 7-Mc. c.w. EHU built a mobile job for his car. HQF increased power to 700 watts. QLW is trying the CD Tests. CMW is at the Valparaiso Technical School. KTX visited EGQ at Gary. To prove you can succeed, IGX, age 64, received his ham ticket after his sixth attempt. He now is president of the Northeastern Indiana Radio Club. BKJ has new exciter and VFO and is building separate finals for 3.5 and 14 Mc. FYC is going mobile. IFX is building a new ham shack in the backyard. AJ has a BC-610. PSB says the situation is clearing up and he may find time to do some hamming. He has a 40-ft. A frame to hang wire on. PRO, JJJ, GPL, and SWH provided emergency communication to Huntertown when a falling aeroplane cut the cable between there and Fort Wayne. A three-way radio link was provided until the police link was set up. JRR now has all the parts for a TVI-free high-power transmitter using a pair of VT127s in the final. GPL, EXV, FRU, and PRO of Fort Wayne visited the Northeastern Indiana Radio Club and had the pleasure of meeting KXSRM. Get your reports and news in, fellows, so I can work up an interesting report for you. Traffic: W9TT 87, BKJ 61, RE 22, KTX 17, SNQ 12, QLW 7.

WISCONSIN — SCM, Rens W. Goetsch, W9RQM — DJV, CBE, WEN, FCF, LRV, JBF, WJH, LFK, and RQM participated in the Oct. CD Party. FKA has a new IT-18 VFO. The WJY Newsletter, edited by DJV, was being enthusiastically received. Reports on the National Emergency Test were received from the following: Milwaukee, RUF; Madison, UFX; Wausau, VHA; Green Bay, WLZ; Marinette, GQG; Stevens Point, CWZ; Racine, SZL; Appleton, IVE; Eau Claire, MUM; Menomonie, WDK. HKL is new EC member. CWZ has been working over a 3.5-Mc. Command transmitter and receiver. Racine

Megacycle Club members BVG, CFP, FKA, HHM, KZZ, and PTN participated in National Radio Week with an interview over WRJN, LBC, Manitowish, worked DDG, Sheboygan, and DDG worked QTZ, Milwaukee, on 144 Mc. IWT is new OD, ARRL, FCC, and club meetings on proposed regulations have kept GPI busy. KKK knocked off VQ5 and EKL. The Manacord Club elected FMH, chief op.; LBC, asst. op.; JAW, keeper of the log; RKT, operations mgr. Officers of the Neenah-Menasha Radio Club are DXV, pres.; RNZ, vice-pres.; VII, secy.-treas.; GJY, act. mgr. A new power supply and 813 final is the answer to a "bigger" signal from FCF. The Rock River Radio Club is proceeding with emergency organization plans. HFV's mobile rig put him on 28-Mc. 'phone. ESJ is busy with the organization of TCNP. CIH, BCF, BTD, BQM, JNU, WJH, and EXW took part in the Sept. F.M.T. CIH topped the list with an accuracy of .00002%! FYP has a new 28-Mc. beam. The Green Bay Mike and Key Club elected G. Van, pres.; H. Haskins, vice-pres.; O. Davis, secy. and EC; O. Thompson, treas. Traffic: (Oct.) W9ESJ 642, RQM 102, CBE 85, IQW 84, FCF 70, SZL 57, CWZ 55, LFR 54, FZC 48, VHA 46, DND 23, YCV 23, SFL 19, IVE 18, HDZ 17, FKA 11, BZU 4, DJV 4, MUM 3, EIZ 2, SIZ 2. (Sept.) W9LVE 18.

DAKOTA DIVISION

SOUTH DAKOTA — SCM, J. S. Foesberg, W9NGM — SOLB has changed to a.m. modulation on his rig and also says that the Milwaukee Railroad Net is getting started. Anyone interested in this net (c.w.), please contact OLB. Fred also is a wheelhorse on the South Dakota c.w. net. GCF, the RM, says that the new net set-up is working out FB as far as he is concerned. It does give an outlet for traffic in any direction and should make for rapid deliveries if enough stations check in. Bill points out that he needs more stations on the net and that the South Dakota net is slow speed, "unless the guy at the other end is a hot shot," to use Bill's words. The Mitchell Club is ARRL affiliated and now has the call ZSJ. Code lessons may be conducted on 28 Mc. in Mitchell. Strong winds in the State in October wrecked several beams as well as taking down a few towers. Traffic: W9GCP 35, OLB 23, FJS 7.

DELTA DIVISION

ARKANSAS — SCM, Marshall Riggs, W5JIC — OXU is getting the DX bug on 7 Mc. lately. OCY is about ready for 3.85-Mc. 'phone. OXU needs two states for WAS on 3.5 Mc. NGB is new EC for Faulkner County and has worked up a good emergency set-up with several 654s. QIP is on 7-Mc. c.w., being recently licensed. OCX is running 105 watts to 274N on 3.5 Mc. with good results. He also has a p.p. 810 rig under construction. NCM is building all-band 813 rig. AUU is inhabiting the 3.5-Mc. band now. HPL has the rig back on 3.5 and 3.85 Mc. Traffic: (Oct.) W5DRW 291, LUX 128, FMF 99, OXU 46. (April) W5DRW 650.

MISSISSIPPI — SCM, J. C. Wallis, W5DLA — Effective Dec. 1st MUG, Floyd Teetson, of Hattiesburg, will succeed JHS as SEC for Mississippi. As SEC we know Floyd will do his very best to serve you. Many thanks to Norman for his sincere efforts during his term. LK has been re-appointed PAM and will have the kw. rig back on soon at new QTH. QLT, at Biloxi, has been appointed OBS. Ex-4PBQ now is 5QDL at Isola, has 250 watts on 28 Mc., and is moving traffic for the KH boys. ZVO is on again after a short absence. WZ, the RM, is working in the Rebel, TLAP, RN5, and Magnolia Nets. Activity is confined to traffic-handling. DEJ, in Meridian, is working in the RN5. We welcome back to our section IHP, whose new QTH is Natchez. LPL has moved to new location and has to put up new skywire. We wish you all a Happy and Prosperous New Year. Traffic: W5WZ 113, JHS 43, KYC 15, QLT 13, ANP 10, HAY 8, OMK 8, DL4 5, QDL 4, DEJ 2.

TENNESSEE — SCM, Ward Buhrman, W4QT — The following ECs were on the job and made reports to the SEC: BAQ, ETN, FLW, FWH, HHQ, KKR, LCB, MEU, and PSB. Memphis reports 19 EC stations participated in the Simulated Emergency Test, and reports from other spots in the section indicate interest in this activity was generally good. CZL claims to have the section's hottest emergency gear, capable of going into action any place, any time, all in a matter of seconds. ZZ also lays claim to a record; his QTH has not changed in 22 years and in fact the station has been operated in the same room for that length of time. LNN is a newcomer to the BPL ranks, and aided by new electronic key should remain in the upper bracket on the traffic list. FLS is working on his third kw. He just doesn't like to change coils. Traffic: W4PL 1545, LNN 608, APT 307, NNJ 249, ETN 69, BAQ 45, FDF 43, CZL 24, NPS 6, FLW 4, LCB 4.

GREAT LAKES DIVISION

KENTUCKY — SCM, W. C. Aleock, W4CDA — Three hundred sixty-two messages for October! Not bad, but why don't you 'phone stations handle some? The KYN (Continued on page 74)

MALLORY HAM BULLETIN



With almost 100 different Mallory selector switches from which to choose, it is understandable how the average amateur may find himself in a quandary when he must choose the one switch best suited for a particular job.

For that reason, we are devoting this edition of the Ham Bulletin to a few comments regarding the use of Mallory switches in typical amateur applications. It is hoped the following comments will prove helpful the next time you have need for one of the Mallory switches.

TRANSMITTER BAND SWITCHING. The #160C series "Hamband" switches are designed especially for low power transmitter use. Styles are available for switching 1 to 5 transmitter stages to 4 predetermined bands. Low loss ceramic insulation is used throughout, and heavy duty terminal lugs, to which the transmitter coils may be fastened, are featured.

TRANSMITTER METER SWITCHING. Two special meter switches are available. The #1400L switch for low power transmitters, enables a single meter to measure up to 12 separate circuits with complete isolation between circuits. The #151L is for use in transmitter service up to 1500 volts DC. A common meter may be used for measurement of 5 plate or screen circuits.

RECEIVER BAND SWITCHING. For receiver service up to 30 MC., the #1200 series switches are recommended. High-grade phenolic insulation is used, and various combinations up to 12 circuits, 6 bands and 6 sections are available. Above 30 MC., the ceramic insulated #170C and #180C series rotary switches are ideal. Combinations are available for switching a maximum of 6 circuits to 5 bands.

TEST EQUIPMENT SWITCHING. Almost all Mallory switches are suitable for this service, however, the #13124L, 24 point tap switch, and the #152L, 6 position, 2 circuit shorting switch are especially valuable for test equipment use. The #13124L is particularly satisfactory for volt-ohm-meter construction, while a swell 6 band utility test oscillator may be built around the #152L.

In addition, the amateur will find occasional use for lever action switches, single and multiple push-button switches, and jack switches, all of which may be had from your Mallory Distributor.

Incidentally, your Mallory Distributor will be glad to discuss your switch problems with you, or, if we can be of help, simply send your requirements to us, c/o P. R. Mallory & Co., Inc., Box 1558, Indianapolis 6, Indiana.

P. R. MALLORY & CO., Inc.
INDIANAPOLIS 6 INDIANA

P. R. MALLORY & CO. Inc.
MALLORY

Net, on 3600 kc. daily at 7 P.M., Sundays at 9 A.M., continues to improve, although more towns are needed for better coverage. The KYB 'Phone Net (Blue Grass) continues popular on night schedules, with the KYP Net operating mornings. What about this new Corn Crackers Net starting up? BAZ says Trunk Line J will be on 3555 kc. It will function as the 9th Regional Net, with coverage on Kentucky, Illinois, Indiana, and Wisconsin; also relays for Tennessee, Alabama, Florida, and via ETN to Pennsylvania, Virginia, and West Virginia. VD keeps northern Kentucky open on KYN Net. Keep up the nice work, Chuck! FKM spent all of October on traffic. VP made an excellent score in the Frequency Measuring Test and will get a higher rating as Official Observer. BXU missed only two net sessions during the month, which is a splendid record. JCN can only get on the KYN Net once a week, but other Louisville stations fill out the week to help out. Don't be bashful about net operation. Write BAZ for details and join up! For the Kentucky nets, the SCM suggests the following as our 1949-50 slogan: "Originate more messages for net operation." If you can't think up a message, maybe you need a shot in the arm. Traffic: W4BAZ 112, YPR 79, NBY 60, CDA 38, MWX 24, BXU 21, FKM 10, JCN 10, VD 8.

MICHIGAN — SCM, Robert B. Cooper, W8AQA — Asst. SCM c.w., Joseph R. Beljan, 88CW, Asst. SCM U.P., Arthur P. Kohn, 8TTY. SEC: GJH, PAM; YNG. RMs: GSJ, UKV. New appointments: ORS to DWB, OO Class I to TDO, OO Class III to SWF, OO Class IV to ENE. UUS is active again with OO work after the completion of his summer's program. Your attention is invited to the paragraph in "Traffic Topics" in November 1949 QST. Please note the universal questioning of the accuracy of the traffic totals. Your messages should be on file at your station and should you be requested to furnish proof of a total the observing of this caution should relieve you of any embarrassment. TTY deserves commendation for his work in laying the foundation for a procedure whereby the FCC will hold examinations for amateur licenses in the Upper Peninsula. YDJ makes the official announcement that the Midwinter Hamfest will be held in Grand Rapids Feb. 25, 1950. DLZ reports very active liaison between Holland, Mich., and Grand Rapids via the GREN. YNG can be found pushing the Transcontinental 'Phone Net on 3.85 Mc. QBO/ATB reports the YLRL Net on 28 Mc. is enjoying a fine start of the new season and EIR is the new YL member in this section. The last Frequency Measuring Test found MGQ, TDO, BVY, and KRS turning in some very close measurements. FX is operating ZZ now that the summer season is over and SCW can no longer operate from the cottage. ZHB promises to do all possible to join the gang on QMN. URM finds married life highly competitive with his amateur activities but hopes to work out a sensible solution. AYV has crystals for the Eastern Shuttle Net and will report in for traffic. UAS reports very favorable progress on the part of the Motor City Radio Club to obtain property for the club-house location. SWF is very happy with his 55-ft. support for his new four-element beam which should boost the coverage on his Official Bulletin Station work. MCV is active on 144 Mc. and we hope AQJ can find that signal some of these days. OAF says the traffic is slow in his area, in fact matching the thermometer, however the DX is very good. Traffic: W8NOH 1150, SCW 249, RJR 233, CRH 60, AQJ 56, YMO 40, DLZ 39, YNG 29, QBO 17, UGD 15, BVY 8, LR 8, YFIS, ZBT 8, TQP 6, MGQ 4, ZB 4, EGI 3, FX 2, ZHB 2, DPE 1, IV 1, URM 1, K8NAG 1.

OHIO — SCM, Dr. Harold E. Stricker, W8WZ — Asst. SCM, Charles Lohner, 8RN, and C. D. Hall, 8FUN. SEC: UPB, RM; PMJ, PAM; PUN. The results of the Ground Wave Contest sponsored by the Cleveland Area Council of Clubs is as follows: Cleveland stations in order of placing are WDQ, AJW, AJH, CKU, BVN, WML, and BLB. WDQ worked the longest distance. Out-of-town stations in order of placing are DJJ, BFH, SRS, DMJ, BSR, BPN, and VE3BJJ. The Cuyahoga County Simulated Emergency was participated in by local mayors, fire chiefs, and the military services. PBZ, the new EC, is to be commended for his efforts. A slow speed net is operating Sundays at 10:30 A.M. on 3700 kc., and the Cuyahoga County mobile emergency frequency is 29,160 kc. from the Carascope: We are all saddened to learn of the death of TO. He was very active in Columbus amateur activity and his passing was deeply felt by all of us. WRN states that 50 and 144 Mc. have been very good and that quite a few stations have been coming through. The October Sine net was a success. The center of operations was Westerville and the emergency was a blizzard. Those participating in the test were WYH, the EC, WAB, OWA, HAM, ABO, and EYE. From the Q-5 of Springfield: For the past several weeks JRG has been engraving all certificates issued by your SCM. GM2DYP visited the October meeting. From the Bulletin of the DARA: An auction was held at the meeting and some good pieces of equipment were bought for a song. The Dayton boys have become traffic-minded lately. ZOF is communication manager for the club and two new ORS, ZJM and YCP, have been appointed in Dayton. OVL states that TVI complaints have dropped to zero since the two Dayton TV stations have come on the air. From the Voice-Cod: ETV is a new ham in Youngstown. He is 12 years old and the son of IOO, who is the EC for Youngstown. IOO

was host to the Mahoning County Amateur Radio Assn. at its October meeting. The next meeting will be held at the home of CUL YKU is a YL in Youngstown. CMS has new 6-ov-10 beam with 4-125A final. WWK is operating 10-11-meter mobile while attending college. PMJ sent in a nice report on stations QNI on BN. FNK has built a new Signal Shifter so he no longer is rockbound. LBH reports some 420-Mc. activity around Akron and has worked 4 stations to date. QBF will be mobile airborne on 3.85 Mc. week ends. JFC is working 28-Mc. c.w. mostly at present. ETS is a new ham in South Euclid. WE is on more now that the WX is cooler and the TV programs on an hour later. PIH is working BN, 8RN, and EAN and has a nice traffic total for the month. AQ still is working on TVI. BUM works on 28 Mc. mostly when able. ROX and the gang from Cleveland visited one Sunday. ZJM worked 227 stations and 56 sections for his first CD Party. PUN is active in ORV, OEN, and DH Nets. YFJ has new 100-watt final and says he is getting out well on 28 Mc. TZO finally made 7-Mc. WAS. DAE is NCS for BN and ESN on Mondays and Saturdays. HB had a total error of zero in the last Frequency Measuring Test. MRG has moved from Cincy to Gallipolis. ODR is on BN, MARS, and CORC. SJF leads in traffic total for October. RN finally got his pole up for his 3.5-Mc. vertical. WAV did 22 hours of observing in October. Traffic: W8SJF 248, DAE 155, PIH 140, HOX 99, PMJ 48, PUN 46, RN 43, PNY 38, OUR 35, YFJ 33, ZAU 32, WAB 30, BEW 20, EXI 19, ROX 16, YCP 14, DXO 12, TAQ 10, AQ 9, LCM 7, DZO 6, BFH 5, WE 5, LBH 3, JFC 2, QIE 2, BUCY 1.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Fred Skinner, W2EQD — SEC: CLL. New manager of the second regional net is CLL, replacing LRW. CLL and TYC made the BPL, the latter for more than 50 deliveries. NYSS Net has an average attendance of 7 stations each night, with 44 different stations reporting so far. NCSs for NYSS are CDQ, PHO, OUT, and YCW. CDQ also reports into TLS. BRS now is going after DX and worked his first European, a GM, with 6L6 oscillator. The SARA is building a club emergency station. WWK is working 3.5- and 3.85-Mc. mobile. The Schenectady County EC unit drills on Thursdays at 1930 EST on 144 Mc., 1945 on 3950 kc., 2000 on 3700 kc. New officers of the SARA are EFU, pres.; CRE, vice-pres.; VUI, secy.; GYV, treas.; KUJ, BKW, and TYN, directors. CLL, NIV, RYT, and EQD held an "old home week" luncheon during the Hudson Division Convention. BYF gave a very interesting talk at the WARA meeting. CLL sent out four OO notices. In reporting traffic, please follow the rules on page 66, Sept. QST. Note that relayed messages count ONE under RECEIVED and ONE under RELAYED, not two under RELAYED as in the old system. Traffic: W2CLL 512, EQD 295, TYC 225, PHO 121, GTC 38, AUS 25, EFU 18, BSH 14, BRS 1.

NEW YORK CITY AND LONG ISLAND — SCM, George V. Cooke, W2OBU. SEC: BYF. RM: TYU. EC reports were received this month from FI, Nassau County EC; WHB, Manhattan EC; TUK, Hempstead-Garden City EC; and SYW, Northern Queens EC. The job of EC for Brooklyn is now vacant. The following is a list of ECs now on the books and the territory they cover: FI, Nassau County; OXM, Mineola; TUK, Hempstead; JXP, Port Washington; GQP, Inwood; KTF, Baldwin; ANN, Lynbrook; DUS, Wantagh; YKM, Bethpage; JND, Syosset; BTA, New Hyde Park; WHB, Manhattan; SYW, Northern Queens. We need more ECs, one in each community. Write SEC BYF with your recommendations. Nassau County's report on the Simulated Emergency Test states 34 stations participated, 22 on 144 Mc. and 12 on 3.5 Mc.; also 4 mobiles on 144 Mc., 3 cars mobile on 3.5 Mc. and 2 maritime-mobile. One fixed portable at Red Cross Headquarters at Mineola acted as control. Queens AEC carried on in good order with increased stations coming in and working from a prearranged plan. BVL, Nassau Radio Club, finally got on 144 Mc. WVN got his Class A license at last. SPI and SMQ work maritime-mobile every Sunday afternoon from the boat. CSO upgraded to Class 100. MPL, CJJ, and YIR secured their OO papers. VAF is new ORS in Babylon. RTZ built a new VFO and put up new 1/4-wave on 3.5 Mc. The Knickerbocker Radio Club, in 9th Regiment Armory, attained affiliation this month. AZS put new Johnson three-element beam on that new mast. RWQ reports DX really improved with new p.p. 4-125A. TYU helped OBU put up "new" antenna then got the bug himself, a 103-ft. flat top with 82.5-ft. 300 twinax feeders. "Pop" schedules NLI, EAN, 2RN, and W6CE on Saturdays and Sundays, and requests those interested in traffic to look for him on the NLI Net, 3710 kc., at 7:00 P.M. Mondays through Fridays. EC asks that stations with West Coast traffic call CQ TLAF, 3630 kc., 9 to 9:30 p.m. when frequency is monitored. Can anyone help with Empire City Radio Club locate meeting rooms in Upper Manhattan? If so, contact SJC or PRE. TUK's biggest kick of the month was handling emergency traffic from KP4DJ on 3.5 Mc. PF is getting in some fun with 'phone patch work by passing calls for YV4AA, W5KAU, and HC1FG, and converted 32V-1 to 32V-2, eliminating most of the TVI.

(Continued on page 76)

Eimac
TUBES

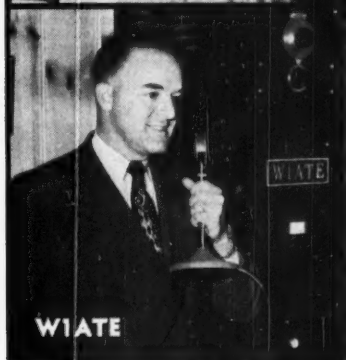
CHOICE OF CHAMPIONS



W8BHW



W2SAI



WIATE



W4KFC

Top operators of the 15th annual ARRL DX contest again have proved the superiority of Eimac tubes.

Highest scoring CW operator W8BHW, Rolf Lindenhayn, powered the final amplifier of his rig with a pair of Eimac 205TH triodes.

For the second straight year 1st place phone went to W2SAI, J. Dawson Ransome. W2SAI used 4-250A tetrodes for his 1949 win.

WIATE, C. R. Knowlton, also used 250TH's for the 2nd place phone position. Third place CW went to another tetrode user W4KFC, Vic Clark, with a pair of Eimac 4-125A's.

Benefit by the experience of these top operators . . . Depend on Eimac tubes to help you get more out of amateur radio.

W8BHW

"The rig here has been the same since the new start in December '46. A Temco 75-GA drives a pair of Eimac 250TH's in final and the original 250TH's are still in there. In between contests, I've filled up six log books with contacts in 209 countries and 40 zones. Also was world high in the 1947 VK contest on CW and second to KP1A on fone."

W2SAI

"As you know I used a great many Eimac tubes in the past and at the present time I am using Eimac tetrodes exclusively in my transmitter, both in the final amplifier and as modulators."

WIATE

"I have used Eimac tubes in my final amplifier in every sweepstakes and DX contest since 1939 without failures or trouble."

W4KFC

"4-125A's were good for 490 contacts in 84 countries and 34 zones in 42 hours of CQ DX contest."

The 16th ARRL DX contest is just around the corner. Modernize your equipment now . . . use your skill plus Eimac tubes to earn a winning score. Complete application notes are available in a packet of data titled: "Tubes for Amateur Service." This information is free, write for yours today.

EITEL-McCULLOUGH, INC.
San Bruno, California

EXPORT AGENTS: FRAZER AND HANSEN, 301 CLAY STREET
SAN FRANCISCO 11, CALIFORNIA, U. S. A.

Watching a Bell Lab. demonstration induced NZJ to dust off the 10,000-Mc. gear and earned him his OEC Certificate. OTA changed his YLs status to the XYL class. The UHF Club in Jamaica has helped 8 teen-agers to secure tickets the past year. BZQ is a new call in N.Y.C.-L.I. WHB is acting as NCS and RM for 80-meter c.w. AEC net, 3600 kc., every Friday at 8:00 p.m. LUW has a 203P on 28 Mc. with 30 watts. KDC earned OPS and now has a gallon on 3.85 Mc. OQR is maintaining daily schedules with DLs with 'phone patch work on this end. QAN, BTA, GG, FI, BYF, and TYU handled election returns from Nassau County on 147.9 Mc. with destination at WNYC. WZG has new HQ-120X and worked 4 Gs the first time he turned it on. North Shore Club has GX heading up extensive TVI program and reports tremendous results. 50ZC now is permanently in the section and the latest member of the Lake Success Club. JVC set up schedule with XYL DLAKS and arranged for two brothers to meet after 30-years separation. BZH is another new ham here. JBQ attained ORS. Traffic: W2TYU 1651, JYR 614, PRE 577, OBU 522, VNJ 402, VOS 202, BO 150, OUT 94, EC 83, TUK 62, CSO 43, YIR 24, LGK 16, SJC 16, YDG 12, PF 10, MPL 7, BGO 5.

NORTHERN NEW JERSEY—SCM, Thomas J. Lydon, W2WAN—The N.N.J. c.w. traffic net meets on 3650 kc. at 7 p.m. Monday through Saturday. The N. J. 75-meter emergency 'phone net meets at 9 a.m. Sunday. NJR has moved into his new home and is operating on 3.85 and 28 Mc. with single sideband rig. AZW has four-element close-spaced 28-Mc. beam on 50-ft. tower and really is working them. QPS has two Abbott beams in phase on 144 Mc. AXJ is on 28-Mc. mobile. The Tri-County Radio Assn. of Plainfield has completed its new station at Red Cross Headquarters. HNY has been appointed chairman of Communications Committee for Red Cross Disaster Control at Plainfield. MEW has moved to Pittsfield, Mass. AOW advises that Spiritual Hamfest will be held on Sunday, Jan. 8, 1950, at 11:00 a.m. EST in St. Matthews Protestant Episcopal Church, Hudson Boulevard and Fulton Ave., Jersey City, N. J. The Reverend Albert E. Martin, B.A., whose call is BWO, will be the officiating minister. His topic will be "God Calls CQ." Traffic: W2VJN 180, KUS 72, OXL 46, ZEP 44, NKD 20, AWY 19.

MIDWEST DIVISION

IOWA—SCM, William G. Davis, W8PP—The Dubuque boys will miss AXH, who has moved to McGregor. The office of president of the Dubuque Club will be taken over by William O'Rourke. BHO leaves McGregor and my informant says his new parish is Cresco. USD reports from Bettendorf. The Des Moines Club had ten mobile rigs out during the Simulated Emergency Test and gave first-hand demonstration for Mr. McIlrath, head of Iowa Red Cross. UHC and SQQ have organized a new net, the "Transcontinental 'Phone Net," and are meeting with great success. TQG finally got his 48th state and his receiver blew up before the QSO was finished. WRM, an old-timer, is back on the air with a 32V-2. The Burlington Club enjoyed the slides of the ARRL Headquarters station. WMU renewed ORS appointments. The Council Bluffs and Ames Clubs held a hidden transmitter hunt recently. LHZ found the transmitter and won twenty bucks. JRY has a pair of 4-125As on 144 Mc. QFZ is on 144 Mc. with an 829 final. AED, BAL, CK, DIB, PP, and ZQF are neglecting ham radio to grunt and groan W.H.O.'s new 50-kw. a.m. in place. HMM and AUL are busy with organizational duties in the new traffic set-up. TILCN reports 26 active members, with QVA as NCS. FF has been televised so 3.85 Mc. won't be the same anymore. LJF has new 310B. PP finally got the 28-Mc. mobile installed. HQA has new transmitter on the air. UAO is new on TILCN. Traffic: W8QVA 88, WMU 84, NYX 60, SCA 49, VRA 46, USD 2.

KANSAS—SCM, Earl N. Johnston, W8ICV—The Kansas University Amateur Radio club elected GOV, pres.; AJV, vice-pres.; SKZ, secy.-treas.; and 3NUZ, act. mgr. Plans are being made for code and theory lessons on 28 Mc. from AHW, the club station. RXI and NUZ report into the Kansas 'phone net and YZF and 7NIE report into the c.w. net. New club sponsor is Prof. James Wolf, 3NTN. ZWB is new licensee in Lawrence. DYX, of Norton, has 28-Mc. 'phone in the car. AHA and ROY have tri-weekly schedules with their sons, YOE and YZF, at K.U. YQQ is new call in Independence. AHA has Class A ticket. SSB is active on 14 Mc. with 500 watts into a pair of 800Gs and 811 modulators and twin triplex antenna. Members of KVBC, Topeka, under the direction of new EC, UPU, had an interesting Simulated Emergency Test Oct. 16th. 10-80-meter bands were used, including several mobiles and ZMC walkie-talkie on 28 Mc. AAZ handled actual emergency traffic from his mobile, assisting in a highway accident not directly to the NCS, K8NRZ, but through K8NMC, in California, with Ray Vickland, IOL, of Topeka, at the mike. BNU, Chanute, reports activity on 3960 kc. Sat. a.m. in C.A.A. Net. TDW is active on 3.5 and 7 Mc. using BC-459 with 25 watts and BC-696 running 40 watts. He now has 35 states toward WAs on 7 Mc. HVL participated in Frequency Measuring Test. Traffic: W8WGM 109, NIY 72, YOS 48, SOE 21, FDJ 19, AHA 18, KXL 17, BNU 15, IFR 14, AHW 3, TDW 2.

MISSOURI—SCM, Ben H. Wendt, W8ICD—Appointments: OZS and EBE as EC, WRQ as OPS, and ECA as Assistant SCM. New Springfield hams are WEP, ZMF, YHL, and VQM. In a recent ARRL Frequency Measuring Test DHN scored with an average error of 446 cycles in three readings. Both of Missouri's main nets are in full swing, taking good care of the traffic coming their way. The old "MOARKY" has been reorganized with OMG as president and MFN as secretary. MOARKY invites all Missouri and Arkansas hams to join. IAD delivered a 10-meter beam to LF and found ADC, PFM, SOM, PKI, ZAC, and WIY on hand to assist in the beam-raising ceremonies. UER takes the bull by the horns in getting on 3.85-Mc. 'phone with 12 watts. He's doing OK, too. The Joplin Club was active in the Simulated Emergency Tests with its AEC group. DEA and GZR relayed much of the traffic of the event. The Kansas City AEC also participated, with NIY relaying the bulk of the long-haul traffic. QAC has moved to a QTH where 110-v. a.c. is available. NNH left some radiogram blanks at the County Fair but the public didn't seem to understand. ARH now has 101 countries on his list with the addition of FEB, ZE2, and VQ5. WAP is rebuilding his entire rig with 162Gs and regulated power supplies. UXT is working 3.5 Mc. and hopes to be on 160 meters soon. TZK erected a new center-fed 3.85-Mc. antenna. PLJ reports 144-Mc. activity picking up in his locality. Traffic: W8QXO 194, PME 37, DEA 23, CGZ 22, KIK 20, NNH 15, PMI 14, WAP 8, ICD 7, QMF 3, GBJ 2.

NEBRASKA—SCM, Scott E. Davison, W8OED—The Nebraska nets are beginning to function in fine shape. The Hastings Club elected PLF, pres.; LZO, vice-pres. and program chairman, and RXU, secy.-treas. LLS has left the Hastings Navy Depot for new duties. GDB has moved to the W6 area and sends greetings to the Nebraska gang. FMW is ready for any emergency with equipment on 40, 80, and 160 meters. YLC put up new antenna. FAM has been appointed RM. IDR is being heard on 160 meters. BDO is a busy guy at KCNI. AYM reports for SENRC. VOI has been elected trustee of the club station for which the club hopes to get the call of RUJ in memory of their former member who gave his life in World War II. VOI is sporting a new Collins 32V-2 transmitter. EDI has a new mobile rig on 3.5-Mc. 'phone and c.w. Thanks, Fran, for the nice report on Lincoln. FLF has new windmill tower in the back yard with 14 Mc. beam and two TV antennas on top. JPI has new 28-Mc. beam up. VEC says his 28-Mc. mobile worked FB on vacation trip. JLD is attending the University this year. CMS moved recently to the Lincoln area. JDJ is building a new mobile rig. FAM is the Nebraska contact with Regional Net, with FQB first alternate and KJP assistant. Yov SCM desires of lining up an Emergency Corps station in every city in the State where an amateur station now exists. Traffic: W8KJP 132, GMD 126, FQB 56, FAM 42, JDJ 27, FMW 16, THF 14, DMY 13, IXL 5, KPA 5.

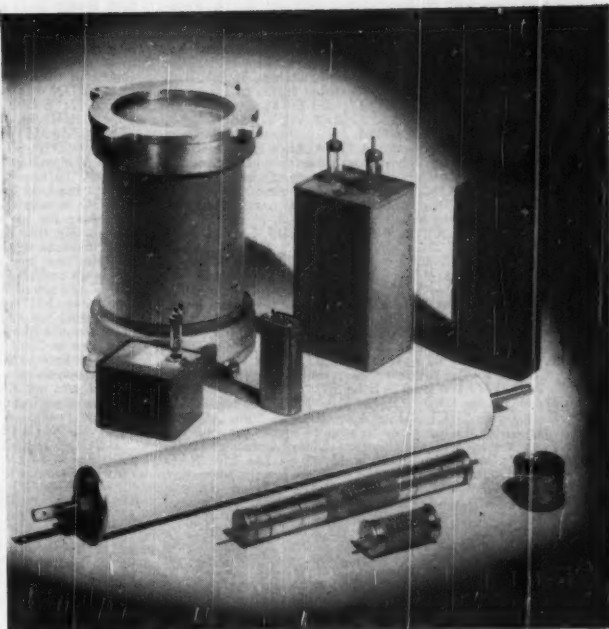
NEW ENGLAND DIVISION

CONNECTICUT—SCM, Walter L. Glover, W1VB—CBHM reports a score of 1107 points in the CN Party and 53,820 in the CD Party. BVB has his 250-watt final about ready for the air. TD reports a new ham in Hamden, SLR. FTX is down to 15 watts. RUF is off the air as he is moving to New Britain. JQD furnishes a fine OO report. BGT has been appointed EC for Naugatuck. The Simulated Emergency Test certainly created a bunch of traffic in this section and put many of the gang in the BPL AW schedules 3AKB, 4PL, 7CZY, 6CE, and ZBO. The Nutmeg Net meeting was held at the club rooms of GB in New Haven on Nov. 12th. The attendance was the best ever, and many problems connected with this season's operations and the coordination with the National Traffic System were discussed and ironed out. The following are the NCS of the net for the winter season: DAV, Mon.; RWS, Tues.; ORP, Wed.; KV, Thurs.; VB, Fri. Any Connecticut station is welcome to join the net, and it is necessary only to report in any evening. HYP has outdone himself with the latest net bulletin, which includes clear instructions for net procedure. Anyone can have a copy by contacting Rog. VW reports the gradual organization of a Connecticut 'phone net. The Connecticut QSO Party turned out to be a great success and a lot of fun. At this writing the high scorer seems to be LVQ with a score of 2040 with 60 contacts in 34 towns. BV regrets he was unable to spend much time on the air during that particular week end. Seems as though it might be a good stunt to have these get-togethers more often. Traffic: W1AW 1270, NJM 678, BDI 454, RWS 426, KUO 262, DAV 209, NEM 209, HYF 187, CTI 132, ORP 121, QIS 109, FTX 104, LVQ 84, LKF 81, HUM 80, QVF 56, KV 44, QAK 42, BVB 37, BIH 32, LV 31, KQY 14, BHM 8, SJ 2.

MAINE—SCM, Manley W. Haskell, W1VV—Pine Tree Net, RM NXX, 3550 kc., 1900 and 2200 hours, Mon. through Fri.; Sea Gull Net, FAM FBJ 1961, 1700 hours, Mon. through Fri.; AEC Net, NCS QUA, 3588 kc., 185 hours, Mon. and Thurs. New OPS is KDE, "Doc" Hineckley, Dark Harbor. Doc's 150-B had a habit of burning out modulation transformers, but he has cured that and

(Continued on page 78)

Special PLASTICON* Capacitors



* Plastic Film Dielectric Capacitors

We manufacture capacitors to specifications for many unusual applications. A few examples are:

- High voltage filter capacitors for compact X-Ray equipment
- Ultra high resistance capacitors for radiation counters
- High voltage—High Q carrier current coupling capacitors
- RF power capacitors for transmitters, dielectric and induction heaters
- Energy storage capacitors for Sonar, welding and photoflash
- Low capacitance drift capacitors for filters
- Laboratory grade capacitors for computers, integrators and bridge standards
- Pulse forming networks for radar
- High voltage AC capacitors for power factor improvement

In addition to our capacitors, we manufacture a standard line and build special high voltage, low current power supplies.

**STANDARD
PLASTICON*
CAPACITORS**

A complete line of standard capacitors for industrial and electronic applications is available. Our engineers will be pleased to discuss your problems.

Write for a copy of our latest catalog



Condenser Products Company

1375 NORTH BRANCH STREET • CHICAGO 22, ILLINOIS

now is in there with the best of 'em. QUI, EC for the Portland area, had his gang on the job at 0700 hours and the Simulated Emergency all wrapped up by 0900, reporting to the SCM via 144 Mc. IGW, EC for Auburn-Lewiston, put on his show on Sunday P.M. All stations went on emergency power carrying through the proposed action. Mobile 3.85 Mc. and portable equipment channelled traffic to LOZ who passed it to the SCM. JRS, QGY, and RYM assisted QUI, and IGW had EZR, LOZ, GPJ, MFJ, HUT, MML, LPA, and LDC to help carry the load. An unhearsd detail was the originating of a message at the Auburn Red Cross for the Portland Chapter. The actual time from acceptance of the message for transmission to delivery of the reply was 18 minutes! The AEC Net with SEC Parker at the helm gathered in traffic from outlying stations, passing same to the PTN and others. Traffic: WILKP 298, NGV 171, YA 171, KILH 134, QUA 121, VV 109, NXX 78, LBJ 51, FBJ 49, KDE 13, AFT 12, EFR 11, LDC 11, PTL 8, JAS 7, QDO 6, TO 6, KEZ 5, FV 3, NHT 2, OHY 2, ROM 2.

EASTERN MASSACHUSETTS — SCM, Frank L. Baker, jr., WIALP — Our Eastern Mass. Net frequency is 3745 kc., QMJ is the RM. AQE is RM for the 7-Mc. band, AAL is RM for 14 and 28 Mc., IN is PAM for 50 Mc., LMB is PAM for 14 Mc. The following are helping out in the Eastern Mass. section of the National Traffic System: FGT, EMG, QMJ, JYJ, KYO, PYM, JCK, LM, MNK is OO, Class 2-4. The following have renewed appointments: IPZ, MD, SH, BWH, MAL as EC; QZS, MEG, AAR, PYM, AQE as ORS; DHX, RP, MEG, AAR, QHC, GOU as ORS; DHX, RP, AAR, GOU as OPS, AQE as RM for 7 Mc. We are sorry to have to report the death of ALY, a member of the Eastern Mass. Amateur Radio Assn. for a long time. AEZ is M/M on 144 Mc. RAD moved to Dedham. We are glad to announce the formation of a new radio club, the Martha's Vineyard Amateur Radio Club with MBQ, pres.; MMI, vice-pres.; OQT, secy.-treas. Other hams on the Island are RMJ, SGL, SLV, ex-40WY, SLW, ex-4PCZ. ONZ/5 writes from Shreveport, La., where he is on 28 and 14 Mc. The El Ray Amateur Radio Club elected BOZ, pres.; AQE, vice-pres.; NXY, secy. LNX, treas.; PSV, chief engineer; JYC, as mgr. RTW and OUP attended the Hudson Division Convention and were portable-mobile. The Waltham Amateur Radio Assn. new officers are LHV, pres.; OGV, vice-pres.; Milton Stinehour, secy.-treas. The Eastern Mass. Amateur Radio Assn. had talks by CTW and BB. HSB has new TV set. ORY is rebuilding beam. CQN is on 3.5-Mc. c.w. GDY will be mobile on 28 Mc. The Brockton Radio Club held an auction and swap and a lecture on receiver TVI. The South Shore Club had an ARRL night with BVR, New England Division Director, and PEK and ICP from Headquarters present. Also an FCC night was held with GM, QVC, and DLT from the Boston office. Q.R.A. held an auction with IIQ as auctioneer. GGH is on 144 Mc. RQZ has a new rig. QZS is on 3.85-Mc. 'phone and has a new rig for c.w. bands. Q.R.A. had CTW at one of its meetings. BB was on during Simulated Emergency Test. KZ5BL wants schedules with hams in Marblehead and Pinchurst on 28-Mc. VFO. LAZ is on 28 Mc. CTZ is on 7-Mc. c.w. AVY needs 28-Mc. VK QSO for WAC. The T-9 Radio Club held a meeting in BVL's cellar. AKN gets on the Brass Hat Net. AAL is on 14-Mc. c.w. ILN has new SX-28. MCR had 12 stations on Simulated Emergency Test. BGW is working DX on 3.5 Mc. KYO is back on again and in our E.M.N. and National Net. The New Bedford Club is active again. QMJ had a score of 315,280 in the CD Contest, with 260 contacts in 48 sections. QMJ reports the following reporting into our Net in the past month: ADL, AHP, AQE, ASN, BL, DTS, DWO, EMG, FGT, FTH, ILN, JYJ, KYO, LM, PYM, QE, QJB, QKM, QSZ, RBZ, SJX, TY, UE, ZR, AZW, EOB, LKP, HUM, 20BU, and 3LOD. Traffic: (Oct.) WIQMJ 353, LM 145, FGT 106, PYM 85, TY 64, EMG 53, QJB 38, AHP 34, AAL 31, KYO 31, DMS 28, MRQ 28, MCR 26, ILN 15, PU 15, BDJ 13, AKN 9, AZW 8, SJX 6, BGW 4, WU 4, QHC 3. (Sept.) WIQMJ 613, PYM 37, ILN 6.

WESTERN MASSACHUSETTS — SCM, Prentiss M. Bailey, WIAZW — SEC: UD. RM: BVR. Net frequency 3725 kc., Mon. through Fri. 7 and 10 p.m., net call WMN. BVR, NY, EON, JYH, UD, LTA, IHI, AZW, HNE, KZS, LUD, HAZ, and PYR attended Rutland Hamfest. BVR attended special Board Meeting at Washington, D. C. and spoke at the South Shore Radio Club at Quincy. EOB worked three new countries for a total of 106, is tops in traffic this month, and placed first in Western Massachusetts in the CD Contest. RHU finally got transmitter in order for CD Contest and a good traffic total. JE finds time a factor for much activity. BDV is slowly coming out of TVI troubles. MUN was imprisoned at his place of business for some time because of a strike. ICH now is T4H from Arizona. ODU became hitched recently. EFQ is very close to DXCC. RDD is active in Naval Reserve. CWG is on 14 Mc. with new beam. RDB writes from Lawrence Academy that he has no time for radio at present. GZ finally hooked North Dakota for WAS. The new 32V-2 really works and sounds pretty. RZG is going to try blocked grid keying to eliminate his chirp. A new ORS, RZG, schedules SSN, ESN, WMN, 4PL, and 2ZEP. IHI says that in a letter from ex-ICH Joe scorns our land of ice and snow. New officers of the Pitts-

field Radio Club are COL, pres.; SAN, vice-pres.; AZW, secy.; PYR, treas.; DPY, act mgr. COI is rebuilding. LLN is contemplating 28-Mc. 'phone for local work. The October Simulated Emergency Test went over very well with activity reported from the Springfield area, Worcester, and Pittsfield. IHI took the honors for accuracy in FMT with 5 p.m. error. MUN was a close second. EFQ and JYH made Class I. Traffic: W1EOB 395, BVR 121, AZW 115, RZG 105, GZ 85, RHU 66, JE 56, IHI 12, BDV 10, GJV 6.

NEW HAMPSHIRE — Acting SCM, Clifton R. Wilkinson, WICRW — CRW visited BFT while he was in the midst of checking the reports on the New Hampshire QSO Party. FTJ has 97 countries confirmed toward DXCC. A dinner was held for AOQ. ATJ now is ORS. Jos Beaulieu, ex-AGO, now is operating 40DX in Birmingham, Ala., and is looking for his old New Hampshire friends on 28-Mc. 'phone. By this time SAL should have his new receiver. POK expects to do some traffic work this winter. A YL operator is a new addition to the NMB family. PVF is a freshman at U.N.H. Other hams on the campus are 1RUX, 1RZN, the son of BB, 2AZO, and 6ZTS. 6ZTS has a BC-348 in his room. SIC is having trouble getting the rigging. ORN is studying law at U. of Kans. LSN is operating HF. If any of you would like to hear some really snappy traffic-handling just tune to 7207 kc. and listen to PAN. They should call that the International Net, as everything from Hawaii to New Hampshire is on this fast net. QJY had a visit from 4MLH and his XYL. Olga also is trying for WAS on 3.5 Mc. and has 27 confirmed. EWF is busy with Navy research project. Traffic: WICRW 351, QJY 63, PPU 41, ATJ 30, MXP 15, NMB 10, KYG 8, EW 5, QJX 3.

RHODE ISLAND — SCM, Roy B. Fuller, WICJH — Assistant SCM LWA has been in attendance at various club meetings around the section and reports increased activity. 28 Mc. shows a large increase with RIT, LZY, RUS, and BGA reporting remarkable results. QLD is working on 3.5 and 7 Mc. with a new Clapp oscillator circuit. JER and CPV can be heard Sundays on 3525 kc. around eleven. JMT has become a steeple-jack in the process of tuning antennas. MQY reminds me that not all of the DX stations have good receivers. HRC, GR, PCQ, BGM, AFO, AKA, QC, DHX, and RWM were among those attending the Bean Supper and Auction sponsored by the NAARO. Station reports at PRA meetings show that a lot of the fellows are building gear, stressing low power and high efficiency. The AQ gang has an 813 oscillator driving an 833A final on 3.5 Mc. Hams or would-be hams are invited to AQ, Kelley Ave., East Providence. Meetings are held every Friday night. LZD, RVQ, and SLV, ex-6WTT, are new members of NAARO. SKT controls the emergency net on 29,080 kc. every Monday at 8 p.m. BBN is a new ORS. Appointments are open for OPS, ORS, OO, and RM. Traffic: WIBBN 10, SKT 4.

VERMONT — SCM, Burtis W. Dean, WINLO — RM: KRV. PAM: PZX. The Green Mountain Amateur Radio Club, Inc. has schoolhouse for club headquarters on the Gleason Road in Mendon. The Club conducts code and theory classes every Wednesday night. PTB has 60-ft. tower with three-element beam and TV antenna rotating on top. QXU and RNF visited RHQ recently. The Vt. 'Phone Net operates on 3860 kc. every Sunday at 0930 and Tuesdays and Thursdays at 1800. The BARC wishes to announce sponsorship of the BARC Certificate for working members of the BARC on or after Nov. 15, 1949. These will be awarded to any and all radio and station stations submitting confirmation of contacts with 10 club members on 10-meter 'phone and/or 15 club members on signal report. QTH, and handle to NLO, secy., BARC, P.O. Box 81, Burlington, Vt. Traffic: WIPZX 26, AXN 11, AVP 10, FPS 7, RNA 5, KJG 4, NLO 3.

NORTHWESTERN DIVISION

IDAHO — SCM, Alan K. Ross, W7IUW — Moscow: I MVA, of the Gem Net, has accepted an operating-intelligence job with the Government. We hope to work him from Washington. Congratulations to GHT on the arrival of a YL jr. operator. WJT did FB in the September Frequency Measuring Test and wonders where the Idaho 7155-kc. gang is. (Friday nights are set aside for 7155 kc.) Focattello: BDJ has new Clapp-crystal heterodyne VFO. GAF has been on the Gem Net. Firth: BAA is building new Clapp VFO. Kuna: EMT put on the feed bag for MVA and IWU while the former was en route to Washington, D. C. Announcing: The Idaho QSO Party will take place between Noon and Midnight MST, Sunday, January 15th. Use all bands, but we suggest 7155 and 3745 kc. when on "40" and "80." I will be on 7155, 3745, and 3950 kc. at various times. Traffic: W7EMT 35, DMZ 29, GHT 25, GTN 13, BDL 16, WJT 12, MVA 6, IWU 2.

MONTANA — SCM, Fred B. Tinstinger, W7EJN — SEC: CT. RM: KGG. PAM: CFY. KGG, the Net Control of MSN for the last two seasons, is new Route Manager. GCS, with a mobile 522 on 144 Mc., has QSOed DSS and DSN in Great Falls when more than 50 miles from town. The Electric City Radio Club holds two meetings a month in the Y.M.C.A. and two meetings a month on 28 Mc., with JGG as Net Control. DSN and DSS in Great Falls are

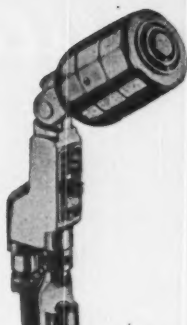
(Continued on page 80)

**It's clearly YOU
on your carrier
...when you
speak out
with an**



The CARDAX

World's favorite premium crystal microphone—the only high level crystal cardioid with dual frequency response. Lists at \$39.50



The "630" DYNAMIC

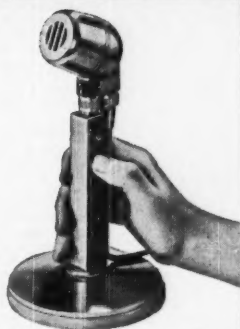
Very popular super-dynamic, long proved in service. Ideal frequency response. High output. Acoustalloy diaphragm. Lists at \$36.50.

Voice of Distinction



The MERCURY

Rugged, handsome Crystal or Dynamic. Extra quality features at minimum cost. Outstanding performer. List prices from \$22.50 to \$31.00.



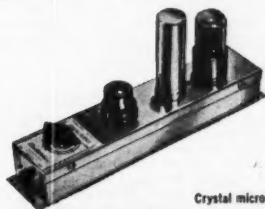
"Break-in" TOUCH-TO-TALK

First to fit any mike with $\frac{3}{8}$ "-27 stand coupler. Finger-tip relay operation or microphone "On-Off." Available separately or with mike.

With an E-V microphone, you assure accurate reproduction of your own speaking voice. The shading and warmth of your speech arrive at the other end of the QSO undistorted and undiminished. Your carrier is modulated with your exact speech...the individuality of your voice is clearly retained...your personality is on your carrier. You get quick recognition and more QSO's.

Choose from today's most complete line. In addition to those shown, it includes E-V Cardyne, Century, Spherex, Mobil-Mikes and others.

Ask your E-V Distributor or write for full details.



SPEECH CLIPPER

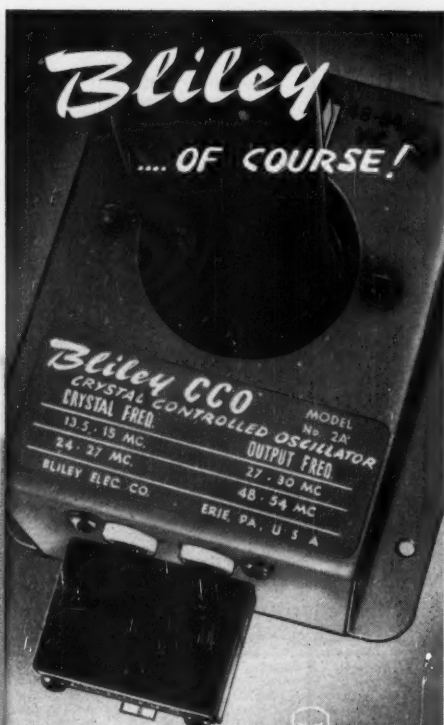
Clips the peaks from speech frequencies which exceed a pre-set amplitude. Adds greatly to articulation and intelligibility in speech transmission, especially in the presence of high QRM or QRN. Holds modulation at 100%. With tubes. Lists at \$24.50.

Crystal microphones licensed under Brush patents

ELECTRO-VOICE, INC., BUCHANAN, MICH.
Export: 13 East 40th St., New York 16, U.S.A., Cables: Ariab
World's Largest Producer of Microphones

NO FINER CHOICE THAN

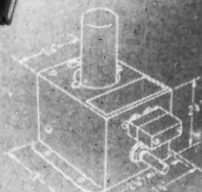
Electro-Voice



TEAMWORK!

High output at less cost with the Bliley CCO-2A Oscillator. Ample drive for VHF medium power tubes. Designed especially for use with Bliley types AX2 and AX3 crystal units on the 2, 6, 10 and 11 meter ham bands.

CCO - 2A Oscillator	\$9.95
AX2 Crystal	\$3.95
AX3 Crystal	\$3.95



EXPERIENCED AMATEURS know they can rely upon Bliley craftsmanship for superior crystal performance on all ham bands! When you need precision, accuracy, and dependability... IT'S BLILEY... OF COURSE!

Bliley

CRYSTALS

BLILEY ELECTRIC COMPANY
UNION STATION BUILDING
ERIE, PA.

using 144.138 Mc., the same frequency as the Miscoula gang. This may be the start of standard frequency for the Montana gang. BQG has new 28-Mc. beam. New calls in Great Falls are NJY, ex-DL4AUW, and NXW, ex-KH0RY. KUH is new EC for the Billings area. A grizzly bear nearly made a Silent Key out of HMT by charging from 50 feet, but Ron dodged around an old shack and the bear was going too fast to zig. FEE has a 100-watt c.w. rig in an extremely small space for hotelroom use. EQM has moved to Idaho. LEQ is new QRS. A slow speed net is in operation on 3520 kc. immediately after 'phone net schedules, or about 8 p.m. Recently we had eight members all sending about 15 w.p.m., but all were old-timers good for 25 w.p.m. or better. Traffic: W7KGF 78, EGN 65, CT 14, COH 3.

OREGON — SCM, J. E. Roden, W7MQ — Astoria: COZ reports that the Club has been showing sound movies almost every meeting night on radio, radar, and television. Baker: The Baker Amateur Radio Club now is affiliated with ARRL. NQD is doing FB work on OSN. Bend: GNJ is helping ESJ and JRU share some of the burden of Net Control on OSN. Corvallis: NNU is new EC. Eugene: AHZ spent the summer working mobile. NHA has moved here from the East. LVN is active as Net Control on OEN 'phone with a fine signal. Klamath Falls: QP won a Sonar VFO at the Sheeta Convention. MYI is mobile on 1.9-Mc. 'phone. HVD loaded up on surplus gear on his visit to San Francisco. LeGrande: NOB is OSN's dependable outlet in LeGrande. Medford: FRO is new vice-pres. of BYRC. DBZ is the Club's technical advisor. Pendleton: KR is the proud owner of a Collins transmitter and receiver. Portland: The Portland Amateur Radio Club's new officers are JSK, pres.; Ralph Harris, vice-pres. and treas.; Opal Williams, secy.; HVC, act. mgr. ESJ is encouraging beginners and slow c.w. operators on the Oregon Slow Speed Net on 3585 kc. nightly at 7:30 p.m. PST. Tillamook: LDP is new EC for this area. FKA is trying to install 3.5-Mc. antennas on a 100-ft. lot surrounded by power lines. Traffic: W7ESJ 317, AXJ 263, JRU 181, HDN 157, HLF 111, MQ 81, GNJ 68, MVJ 59, BDN 50, FRT 49, GXO 43, GWE 33, FY 28, ADX 27, OU 77, HVD 24, KL 17, KVG 15, JVO 14, NOB 14, HVX 8, LT 5, NQD 3.

WASHINGTON — SCM, Clifford Cavanaugh, W7ACF — SEC: KAA, RM: CZY, PAM: CKT, FPP, editor of *HI-MU JOURNAL*, the official organ of the Walla Walla Radio Club, is to be congratulated on the fine job of publishing club activities he has done this past year. HWK is in the hospital with a bad heart — no doubt due to high-speed traffic work on WSN. AXT wonders what to do with a pair of 304TLs that he paid eight cents for. CZY has new Collins exciter. KCU wants a job as campaign manager in the coming SCM election. EAU is keeping Centralia on the traffic map. CKT reports that WARTS has a 160-meter section in case any of the Class B boys are interested. DXF is doing a fine job publishing QRA, JJK and KIX send in ORS applications. LMQ is attending W.S.C. and pounding brass at YH. BZR is working on all-band mobile rig. FWD is rigging up his station so that he can lie in bed and keep late WSNET schedule. NJE keeps c.w. schedules on WARTS Net from Seattle University. LVB is doing a good job as WSN outlet at Sedro-Woolley. JZR is a busy hunter; he hunts ducks and pole pigs. ETK sends in nice OO report. FIX reports that Oregon nets are using WSN manual and system of counting attendance. ETO is going to blast the boys with a 500-watt Millen rig soon. WY is low power DXing. JC is working lots of hard-to-get DX. DXA on 3.5 Mc. DRA reports nice visits with FIX and KAA. New officers of the Vancouver Amateur Radio Club are BPW, pres.; KTL, vice-pres.; Don Klimski, secy. KAA is building a new shack and going to school besides doing a fine job as our SEC. Admiral Exner, ZU, is giving talks before radio clubs all over the country on how M/M radio can work to advantage on large yachts such as his. CWN's plate transformer went up in smoke. KWC reports that the AEC gang in Bellingham helped the police take care of things on Halloween. LXP, ILR, LVO, FOK, and HDG had portable gear in cars while MBY and KWC ran the control gear set up in the police station. The police welcomed them with open arms and they managed to ruin some good plans the kids had set up. Traffic: W7CZY 1896, CKT 702, KCU 394, FIX 322, YH 286, ZU 246, KAA 157, JJK 126, NJE 85, JZR 84, ACF 73, DRA 71, MCU 68, FWD 58, LVB 49, QGN 47, EAU 42, ETO 37, GR 34, BZR 31, APS 29, AXT 23, KWC 23, JC 14, KTL 9, NRB 9, GAT 7, CWN 6, DXF 6, AMZ 3, MYF 1, WY 1.

PACIFIC DIVISION

HAWAII — SCM, Dr. Robert Katsuki, KH6HJ — The Hawaii Regional Net (c.w.), otherwise known as the Pineapple Net, now includes the four major islands: BW (RM) on Oahu, PL on Kauai, PX on Maui, and WW on Hawaii. Traffic increased with the arrival of the "MIKI" boys. MN, our PAM, also has organized a 'phone net linking the major islands: BI, AY, OB on Oahu; PG on Kauai; R8 and RZ on Maui; and IN on Hawaii. ET is EC for Maui. The Maui ARC is celebrating its 10th anniversary. Kauai now has an ARC with IJ as chairman with 26 members. RU has been appointed OBS and is making OB transmissions on Mondays, Wednesdays, Fridays, and Saturdays at 8 p.m. (Continued on page 88)

*What a
Sweet Running Rig!
Glad I Use Ohmite!*

**For Components You Can
Depend Upon... Specify OHMITE!**



**"LITTLE DEVIL"
COMPOSITION RESISTORS**

These tiny but rugged insulated composition units come in $\frac{1}{2}$, 1, and 2-watt sizes. 10 Ohms to 22 megohms. Tol. $\pm 5\%$ and $\pm 10\%$.

**"BROWN DEVIL"
VITREOUS-ENAMELED
RESISTORS**

Wire wound on a strong ceramic core—protected and insulated by special vitreous enamel. Easily mounted by $1\frac{1}{2}$ " tinned wire leads. 5, 10, and 20 Watts. Tol. $\pm 10\%$.



**TYPE AB
POTENTIOMETER**

This reliable, high-quality potentiometer is built to last! Its resistance element is solid-molded, heat-treated material—not merely sprayed or painted on. Thus the noise level is low and often decreases with use. The unit has a 2-watt rating with a good margin of safety.



**CLOSE-CONTROL
RHEOSTATS**

Constructed entirely of ceramic and metal, Ohmite rheostats can be relied on for close control throughout their long life. They are unsurpassed for smooth action, too—the metal-graphite brush freely floats on evenly wound resistance wires. Ten sizes, 25 to 1000 watts.



**DUMMY
ANTENNA
RESISTORS**

Particularly useful for loading radio transmitters or other radio frequency sources. Available in 100 and 250-watt sizes, 52 to 600 ohms, tol. $\pm 5\%$.



**DIRECTION
INDICATOR
POTENTIOMETER**

Compact, low cost. Used in a simple circuit to remotely indicate the position of a rotary beam antenna. Write for Bulletin 128.



**R. F.
PLATE
CHOKES**

"Frequency Rated" for easy selection and top performance! They are single-layer wound on low power-factor cores, and cover the entire frequency range from 3 to 320 mc. Two sizes rated 600 ma.; five others 1000 ma.

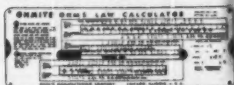


PARASITIC SUPPRESSOR

For the suppression of u.h.f. parasitic oscillations. Consists of a 50-ohm noninductive resistor and 0.3 microhenry choke connected in parallel.



**POCKET-SIZE
OHM'S LAW CALCULATOR**



Simple, quick, accurate! Solves any Ohm's Law problem. Also multiplies, divides, gives squares and square roots. If your distributor can't supply you, send 25c.

Write for Bulletin 137 "Ohmite
Ham Hints" and Catalog 21.

OHMITE MANUFACTURING CO.
4863 Flournoy St. Chicago 44, Ill.

Be Right with **OHMITE**

Reg. U. S. Pat. Off.

RHEOSTATS • RESISTORS • TAP SWITCHES

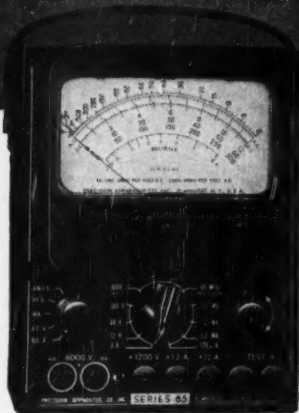


PRECISION Series 85

AC-DC Circuit Tester

(20,000 Ohms per Volt)

will help **YOU** to
STAY on the AIR



**Self-Contained to
6000 volts, 60 Megohms, 12 Amperes, +70DB**

A compact, laboratory type, high sensitivity test set indispensable for test and maintenance of modern amateur communications equipment.

20,000 Ohms per Volt D.C. — 1000 Ohms per Volt A.C.

VOLTAGE RANGES: 0-3-12-60-300-1200-6000 A.C. & D.C.

CURRENT RANGES: 0-120 microamps; 0-1.2-12-120-MA;

0-1.2-12 Amps D.C.

RESISTANCE RANGES: 0-6000-600,000 Ohms — 6-60 Megohms.

DECIBEL RANGES: From -26 to +70DB.

Complete with batteries and test leads. **\$3875**

PLUS superior physical features:

- ★ 4½", 50 microamps, Easy Reading Meter.
- ★ Heavy duty bakelite case 5½ x 7½ x 3".
- ★ Deep etched, anodized aluminum panel.
- ★ Recessed 6000 volt safety jacks.
- ★ Only two pin jacks for all standard ranges.

LC-1 LEATHER CARRYING CASE—Custom designed, top-grain cowhide case with tool and test lead compartment. \$875 See Series 85 and other famous "Precision" instruments, on display at leading radio parts and ham equipment distributors. Write for latest catalog.

Precision Apparatus Co., Inc.

92-27 Horace Harding Blvd., Elmhurst 13, N. Y.

Export: 458 B'way, N. Y. City, U.S.A. Cables: MORHANEX
In Canada: Atlas Radio Corp. Ltd., Toronto, Ontario

HST on 3950 kc. The Honolulu Amateur Radio Club held a dinner meeting on Oct. 17th at the Nuuanu YMCA. The program featured mobile radio, with CM giving the highlights on his latest mobile rig. Traffic: KH0PL 82, BW 48, HJ 37, PX 8.

SANTA CLARA VALLEY—SCM, Roy E. Pinkham, W6BPT—DAE and WOZ are busy working the American Legion Net on 3.875 Mc. each night at 8 o'clock. LZL is off the air at present building a new rig. NX is having fun tuning up new 10-and-20 beam. KIN is building TV antennas. AVJ has put up tower to mount his new 28-Mc. stacked beams. The following were among those who attended the Pacific Division Convention at Reno: CFK and family, HC and XYL, and LZL, YQN, NKP, and FYA. HC came home with a major prize, an HRO-7. JSB is trying a Lazy H antenna on 28 Mc. DAE has moved his transmitter from the Red Cross Headquarters to his home QTH and is using it on 3.85 Mc. for his net activities. DCL is to be heard on 3.85-Mc. 'phone from Salinas. CIS is checking in on the Valley Net when he can find the time. All stations in the section are invited to check in each night Monday through Friday at 7:15 p.m. on 3.775 Mc. There is need for stations in Palo Alto, San Mateo, Salinas, and Santa Cruz in order to give the section net good coverage. Those interested please contact NW for all information. AYL has his kw. in operation on several bands from his new QTH in the Santa Cruz Mountains. Vern is laying out a very good signal. Well, gang, let's have more traffic reports. Please get them in the mail by the third of each month. Traffic: W6NW 157, JSB 112, ZRJ 58, BPT 49, RFF 6.

EAST BAY—SCM, Horace R. Greer, W6TI—Aast. SCM, Charles P. Henry, 6EJA. SEC: OBJ. ECs: AKB, EHS, NNS, IT, IDY, QDE, WGM. Aast. EC u.h.f.: OJU. RMC: FDR, ZM. On Nov. 1st TUU passed away. BIL has new Hy-Lite 2-element 20-meter rotary up. OT turned in a nice traffic report under chief operator Bill Nations. FDR is looking for c.w. and 'phone outlets for the East Bay Section Traffic Net. Gang, here is a chance to handle some traffic. ITH made the first Trans-Pacific radioteletype with Philippines with DU1HR on Oct. 18th. YDI reports that OJU has moved 3 miles northeast of Sebastopol with 13 acres for an antenna farm. DTW claims a first with a QSO with AC4BN on Sept. 23rd at 5:45 p.m. PBT with his 25 watts. He also has started a code practice program on 28 Mc. 3 nights per week. MLZ took a section out of his beam tower and claims it gives him a more favorable angle of radiation. The North Bay Two Meter Emergency Net meets on Fridays at 7 p.m. on 147.1 Mc. with WGM as Net Control. Have you seen IKQ's 28-Mc. beam yet? KZF is working at Peck's on College Ave. selling wire recorders. Many of the East Bay gang were on hand Oct. 29-30 at the Pacific Division Convention in Reno. OBJ reports that now summer is over we should put some extra time and effort on emergency work. Your SCM would appreciate a list of all the new club officers for 1950 for his files. We understand the SARO had an FB Field Day on Oct. 6th. The Oakland Radio Club had an Old Timers Night on Oct. 20th. ZM would enjoy hearing from the gang. Your opinions are requested on a suggestion to eliminate Station Activities reports from QST, substituting "Station Activity Highlights." This would include items that SCMs considered of general amateur interest. Any QST space thus saved would be used for articles on topics such as radio club doings, emergency nets, special organizational effort, etc. Please give this some thought and advise me so I may make a report to the Communications Dept. Committee. Your SCM would like to take this opportunity to wish one and all a bright 1950 with all the trimmings. Traffic: W6OT 310, FDR 298, YDI 31, DTW 24, ITH 20, WIL 8, TI 2.

SAN FRANCISCO—SCM, Samuel C. Van Liew, W6NL—Phone JU 7-6457. KG6DI reports the following: KG6DI is making arrangements to rebroadcast wire recordings of code lessons and official bulletins in cooperation with ARRL Bulletin No. 200. On Oct. 28th, Everett, Wash., time, and Oct. 29th, Guam time, a chess match was held between the Guam and Everett chess clubs. Approximately five hours of solid communication was required. W7IOQ and KG6DI provided 14-Mc. 'phone communications. KG6DI and W7CZY provided 7-Mc. c.w. communications and 144-Mc. communications was carried on between W7CZY and W7IOQ. KG6DI is able to handle 'phone patches wherever possible on Guam; during October Clark handled more than 650 'phone patches. The Eureka AEC gang was active in the Simulated Emergency Test Oct. 15-16. The fellows set up their control station at the Red Cross office and proceeded with test drill to mobile gear in the area. EC 8LX was in charge of the program, assisted by OUT, AUB, FYY, AEY, FXY, BJO, BWV, and K6NRU. Contact with CXO was established and traffic to Headquarters and N.R.C. was handled. BME is putting a 522 on 144 Mc. GDV is on 28-Mc. 'phone and soon will have ARC-4 on 144 Mc. CFE is a new station at Longvale. GXK is working on a 3.5-Mc. rig and is building grid dip meter. FYY is active in the Mission Trail Net. FYY keeps nightly schedules on 144 Mc. with BJO and FCL. WYP is revamping the transmitter and installing antenna for 7 Mc. ZSE is having power-pack trouble. CWK is rebuilding final. ZHE also is rebuilding. BWV is planning a big rig. The San Francisco gang

(Continued on page 84)



MULTIPLE CONDUCTOR CABLES

Every Type for Every Service

Sold Exclusively Through Recognized Wholesale Distributors



Belden
Radio WIRE



PANEL METERS that STAY ACCURATE

Soft iron pole pieces and full bridge construction are only two of the design and production superiorities which have made SIMPSON the most popular meter among amateurs.

See your nearest
Radio Parts Jobber.

SIMPSON ELECTRIC COMPANY

3200-3218 W. KINZIE ST.
CHICAGO 44, ILLINOIS

In Canada: Bach-Simpson, Ltd.,
London, Ont.

turned out in good numbers to aid in manning the N.R.C. station, CXO, during the drill period. Over the 48-hour test period about twenty operators maintained continuous watch on 3875, 7100 and 14,050 kc. and 144 through 148 Mc. The Oakland Radio Club station, OT, kindly assisted by handling a 48-hour watch on 3550 kc. A continuous 144-Mc. channel was maintained between CXO and OT. OT was manned by the members of the Oakland Radio Club. Traffic was not as heavy as expected, the period accounting for only about 80 messages. However, both OT and CXO faithfully stood by their respective watches throughout the test period. BYS is trying out phase modulation on his 144-Mc. rig. VPC now is operating PN Net and RN-4 Net. His traffic activities now are about 60 per cent of his operating time; the rest is divided between rag chewing and experimenting. A new mobile net now active in the San Francisco area operates every Tuesday night with CHP as Net Control and may be found on 147 Mc. The Net is crystal-controlled. Crystals may be obtained from EC BYS. On Oct. 23 the local Red Cross chapter held a Simulated Emergency drill. Radio mobile communication was furnished by the local Emergency Corps, the operators and equipment being furnished by the Golden West Frequency Modulation Club. MXV is building a 150-watt fully automatic-controlled transmitter. BIP now is operating from his old home location. NL is building a new shack. CHP is operating from his new location and is on 144 Mc. mostly. Many of you old-timers who remember Ed Turner, jr., will be glad to hear that Ed is back with us. He now is located in Millbrae with the call NVO. Traffic: KG6DI 902, W6VPC 17.

SACRAMENTO VALLEY — SCM, Ronald G. Martin, W6ZF — Asst. SCMs: Central Area: Willie Van de Camp, 6CKV. Southern Area: Robert Metke, 6SUP. SEC: KME. ECs: Met. Sacramento, BVK; Walnut Grove, AYZ; Duns-muir, JDN; HBM, Chico and vicinity. RM: PIV. OES: PIV. OBS: AF and BTY. OO: ZYV and BTY. Sac. Valley Emergency Net, 146.52 Mc., NCS KME. Sac. Emergency Net (City), NCS AUO. Sac. Valley Section Traffic Net, 29.4 Mc., NCS ZYV. Central Area: CKV reports GERC annual barbecue held Oct. 22nd was a huge success. HBM is consistent traffic relay on 144 Mc. KRX schedules SFNV Sundays and 6PXB daily on 28 Mc. Southern Area: GDJ has 161 countries verified out of 169 worked. GDO has new 40-ft. steel mast. GZY returned to 144 and 28 Mc. QDT cured TVI on 3.85- and 28-Mc. phone rig with Faraday Shields and shielded antenna tuner. CQK is building portable using Command sets. HEM now is Class A. KME works East Coast regularly on 28-Mc. mobile. On Oct. 30th the Emergency Net furnished communications for the Annual In-board Speed Boat Classic with HHC, HMC, KME, GDE, and BLP participating. ZYV received card from ZS6CV to make phone WAC. BLP has six-element 144-Mc. wide-spaced beam. NBW is running 165 watts to T-55. CTH visited Placer Radio Club to show off new mobile unit. MYL and JIN have 832 on 144 Mc. and sixteen-element beam, also 812 on all bands with 100 watts. ASE has 300 watts to 813 on 28-Mc. phone and 522 on 144 Mc. with three-element beam. CXG has gone to 490 Mc. Northern Area: JDN joined RN6 and is on Mission Trail regularly. The Mt. Shasta Club's two October meetings brought out a large attendance. REB is cruising on 3.5 and 7 Mc. Traffic: W6PIV 235, ZYV 116, KRX 49, ZF 31, JDN 22, HEM 3.

SAN JOAQUIN VALLEY — SCM, Ted R. Souza, W6FKL — Asst. SCM, James F. Wakefield, 6PSQ. SEC: JPS. ECs: VTZ, PHL, AJE, and WBZ. OWL and JPU are on 3.85 Mc. with very fine-sounding n.f.m. signals. OHB wants a new receiver — a Collins, he says. PHL is pretty busy with the police radio system in Merced. AJE is the new EC for Modesto and vicinity. JWK is building another final — one for each band is the goal. TFH now is one of the power trust — a full gallon no less. SRU, the indefatigable DX-chaser, still is at it. GRO keeps a busy schedule on 3.85 and 29 Mc. PPO, ex-7JEA, is back living in Fresno between voyages skipping a transport to the Orient. Look for Wally on maritime mobile. TV likes traffic schedules but says he travels too much. TAC station, EXN, made the BPL during the local fair. YGZ expects to forego single blessedness in the near future. GJO and WBZ made the long trek to the Reno Convention. Other safari parties going into the wilds of Nevada were PSQ and JPU, BJI and FKL, FYM and his XYL. JPU won the pre-registration prize. Traffic: (Oct.) W6GRO 58. (Aug.) W6BXN 511.

ROANOKE DIVISION

NORTH CAROLINA — SCM, W. J. Wortman, W4CYB — Hope the gang who made the trip enjoyed the hamfest in Charlotte, sponsored by the Mecklenburg Amateur Radio Society. Who will be next to hold a hamfest? Any bids? The Thomasville gang is celebrating its second anniversary in the Club, and is sponsoring a membership drive and a class to help newcomers to obtain their tickets. OFO is working on a new rig for a few more watts. MWV has plenty of r.f. in his shack — 'tis reported that his walls bulge outward, but he manages a weekly contact with 9QHX. EGF has mobile aspirations on 28 Mc. Pat Burt, secretary of the Thomasville Club, is giving us dope that really is appreciated. FXU says that the Kinston Club is

(Continued on page 86)



GREATER *Listening* PLEASURE

WITH THE NEW GENUINE JENSEN WIDE-RANGE LOUDSPEAKERS

16 COMPLETELY NEW MODELS

Three 15-inch Coaxials, One 12-inch Coaxial, Eleven 5-inch to 15-inch Single-Radiator Models

With these new models, Jensen offers the most complete line of high quality loudspeakers in the history of sound reproduction. There is a Genuine JENSEN Wide-Range Loudspeaker available for every application.

Write now for Data Sheet No. 152 describing all the new loudspeakers in the new Genuine JENSEN Wide-Range Series, and booklet, "Let Music Come to Life!"



JENSEN MANUFACTURING COMPANY *Division of the Muter Company*

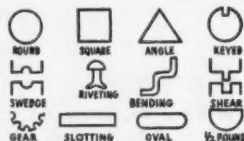
6611 South Laramie Avenue, Chicago 38, Illinois

In Canada: Copper Wire Products, Ltd., 351 Carlaw Avenue, Toronto

New HAM-R-PRESS

TRADE MARK

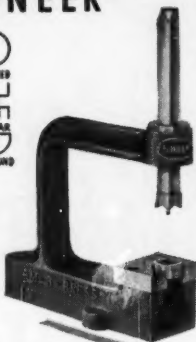
by PIONEER



**HAMMER BLOW
POWER
MODEL H75
7 1/2" THROAT**

\$16.95 NET

PUNCH AND DIE EXTRA

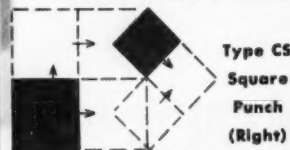


PAT. PENDING

NOW chassis punching in almost every size and shape may be done in your own workshop with the unique NEW PIONEER BROACH "HAM-R-PRESS". Punch mounting hole for ANY electronic part. Easily. No drilling. . . Slip punch on ram. Insert die in work table. Lower ram to chassis and strike top of ram with hammer. Hole complete. . . Same of its features: Simple operation—Precision alignment—Deep throat—LOW COST. No Starting Hole Needed.

H50—5" Throat... \$ 9.95	H120—12" Throat... \$24.95
H75—7 1/2" Throat... 16.95	H240—24" Throat... 39.95
ROUNDS	Punches Dies
1/8, 1/4, 3/8, 1/2	\$.80 \$.65
5/8, 1 1/4, 3/4, 1, 1 1/4	1.20 .80
1 1/2, 1 3/4, 1 1/2, 1 3/4	1.20 .80
SQUARES—3/8, 1/2	1.25 1.00
3/4, 1	1.50 1.25
KEYED—1 1/4	1.40 1.20
RIVETING SET—Requires Adaptor HAD-5	1.50
SHEARING SET—[1" length of cut]	3.75
CABLE SWAGER SET	2.75
DIE RAISER—3" high	3.95
HAD-5 ADAPTOR—For 1/2" and under dies	1.00

PIONEER CHASSIS PUNCHES CUT ROUND-SQUARE-KEYED HOLES—



CUTS ANY SIZE HOLE LARGER.
SQUARES: 1/4 — \$2.95, 1/2 — \$3.25, 3/4 — \$3.50, 1 — \$3.95

ROUNDS: 1/8 to 1/2 — \$1.95, 1 — \$2.15, 1 1/4 to 1 1/2 — \$2.30.
KEYED: 1 1/4 — \$3.50. For mounting IF's, Terminal Strips, Sockets, Plugs, Meters, Controls, Xformers, Switches, Panel Lites, Etc. . .
SIMPLE HAND WRENCH SCREW ACTION. . . CUTS CLEAN.

Available with Descriptive Literature
"AT YOUR FAVORITE DISTRIBUTOR"

PIONEER
BROACH COMPANY
LOS ANGELES 15, CALIF.

undergoing reorganization. Give us some dope, Bob, and luck to OIK. KJS is trying to maintain activity in the NCN with able assistance from NXS. How about some of you fellows getting in and helping with the traffic for this area? Any help would be appreciated. HUW is new Net Control for the Tar Heel Net, replacing HGC, who finished a successful term and a good job. Congratulations, Bob. Activity is picking up on 50 and 144 Mc. in this area with DLX and DIS active on 144 Mc. and CVQ probably pushing 50 Mc. more than any others. Bet I hear about this from some more of you h.f. experimenters — I hope. Luck to the gang in the New Year.

SOUTH CAROLINA — SCM, Wade H. Holland, W4AZT — Applications for ORS, OBS, OPS, OO, and EC appointments are invited. The Clemson College Club will participate in MARS. Professor AUT addressed the Greenville Club at a dinner meeting. The Charleston County Fair will operate a transmitter at the Charleston County Fair. Western South Carolina 10-meter Net meets Wednesdays at 9:00 p.m. on 29 Mc. and has member stations in North Carolina and Georgia. PVQ is new in Georgetown on 28 Mc. OWW is on 144 Mc. LK is on 50 Mc. GMP has a scanning beam and roving oscillator on 50 and 144 Mc. at Mine Craft Base, Charleston. OMP is on 160 meters at Manning, and ETF is on 28 Mc. NLP is looking for contacts on 50 Mc. from Hemingway. BEM is experimenting with amateur TV in Columbia. DX has a 3.85-Mc. mobile unit. IIB is in Charleston with the Navy. LK, NRC, NTD, and ONJ are active on 28 Mc. FNC, LSD, OSC, and PLX are active from Ware Shoals. BSS is DXing on 50 and 144 Mc. BIZ is mobile on 7-Mc. c.w. South Carolina and Georgia c.w. nets are combined on 3525 kc. DFC took part in recent Simulated Emergency Test. Traffic: W4ANK 303, AUT 94, AZT 38, IYA 14, CZN 6, OWW 4, DFC 1.

VIRGINIA — SCM, Victor C. Clark, W4KFC — Asst. SCM, Elias Etheridge, Jr., 4KYD. JCU reports that the following Lynchburg area hams turned out for organizational meetings of the new Lynchburg Amateur Radio Club: ISA, JAJ, JCU, JMY, KBJ, KSV, NPU, ODA, OMI, PDP, QVL, PED, NDO, and ex-3BRY. JCU is president and PED secretary. William and Mary College hams are operating a 150-watt rig under the call of MLE, pending receipt of club license. Operators are MLE, JGW, NRO, NHX, 1PQZ, 2BWL, 2CKM, 3PZD, and 0WJG with MLE, pres.; 2CKM, vice-pres.; and Larry BLM, treas. PAM CLD reports VFN is going strong. VFN, operating in two sessions (7 and 10 p.m.), attracts about twenty Virginia hams nightly. LAP reported in from an airplane over Ohio on one session! Official Observer CVO is firing up BC-610 for VFN use. QY, back from a CAA junket around the U.S.A., reports visiting IAAE and 7HRM. ITA helped a VE ham to obtain some hard-to-get items of surplus equipment, but had to obtain permit from VE government to mail 'em. KZ5AX, now in Chincoteague, is awaiting a W4 call. 7DU moved to Falls Church. CJS is readying the rig for 3.5 Mc. and traffic work. KYD landed 7EMT on 3.5 Mc. for first Idaho QSO. BZE rolled up 409,000 points in October CD Party! Others participating were: FFF, HUF, JFE, JHK, KFC, KFT, KVM, KYD, LAP, LPP, LRI, NJV, and VE IWO, FV, and KVM operated in 'phone section of the party. Submitting very creditable entries in September Frequency Measuring Test were CVO, IPC, IYC, IYI, LNT, WO, ZV, and KZ5AX/4. New appointees: MLH and OZA as ORS, NAD as OPS, and FF as EC for Fairfax County. KP6AA was guest at PVRC meeting. Traffic: W4LAP 226, MLE 215, KVM 196, KFC 127, FF 91, MLH 86, FV 53, JHK 48, LA 41, KYD 30, IPC 20, PED 17, PAS 7, CJS 6, YEJ 6, CLD 5, BZE 4, IWO 4, ITA 3, QWM 1.

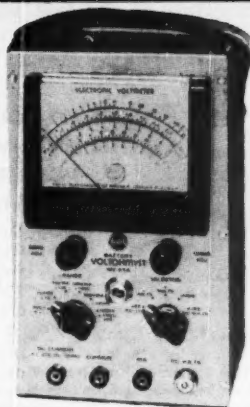
WEST VIRGINIA — SCM, Donald B. Morris, W8JM — Consistent efforts on 144 Mc. paid off when EP worked 800 miles, only 60 short of the DX record. MIS made history on 3.85-Mc. 'phone when he retired his 20-year-old 211 for two 807s. BOK now has 3.5-, 14-, and 28-Mc. doublets in operation. JML is on 28-Mc. 'phone and c.w. with new three-element beam. KWL and FMU visited DFC. EUB is a new amateur in Parkersburg. MIT is president of Parkersburg Radio Club and is experimenting on 144 Mc. BNL has new 813 for 3770-kc. traffic. 4IUU visited OXO. BWI is active on 3.5 Mc. from Spencer. WSL keeps 'phone schedule on 28 Mc. with Holland and is thinking about DXCC. AUJ, OXO, and GBF boost traffic totals by net activity. I would appreciate it if all active stations would drop me a postal card. YGL has new mobile 10-watt rig for CAP operation on 2374 kc. MARA held Annual 'Freeze-Out' Party high in the Blue Ridge Mountains using the call SP to snag rare DX. The YLRL is planning a trip to West Virginia for YL contact. Let's try to get at least one YL station active in West Virginia. Traffic: W8OXO 186, GBF 186, AUJ 46, DFC 40, BNL 30, BWK 14, BOK 3, JM 3, SP 1.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, M. W. Mitchell, W9IQZ — SECs: KHQ and IC. RM: IC. MAN: 7190 kc., 2030 MST. Mon.-Fri., IC manager. ERN: 3540 kc. (temp.), 1945 MST. no manager appointment. TWN: 3540 kc., 1945 MST.

(Continued on page 90)

HARVEY *does it!* AGAIN!



RCA

Battery VoltOhmyst, Type WV-65A

with

Completely Self-Contained Power Supply

DESCRIPTION

The Battery VoltOhmyst is a push-pull VTVM with 2-tube bridge circuit, possessing excellent linearity and stability characteristics. Circuit innovations that include zero grid current and controlled inverse feedback produce accurate readings over all ranges.

A high degree of self regulation is obtained without sacrifice of sensitivity. D-C input resistance has the unusually high value of 11 megohms.

A 1-meg. shielded signal-tracing probe makes possible dynamic voltage measurements in signal-carrying circuits. The WV-65A is exceedingly stable in operation, requires no adjustment of zero controls when changing ranges and is essentially independent of changes in both tube characteristics and battery voltages during normal life.

A neon lamp mounted on the panel flashes whenever the battery is on.

The a-c circuit using a copper oxide rectifier is isolated from the case. The d-c circuit for current measurements is also isolated from the case. Meter movement 2% accuracy. All multipliers 1% accuracy, same as in instruments selling at many times this price.

SPECIFICATIONS

D-C Voltmeter:

Six Ranges 0-3, 0-10, 0-30, 0-100, 0-300, 0-1000 volts
Input Resistance.....11 megohms constant for all ranges
Sensitivity (max.) 3.7 megohms per volt on 3-volt range

A-C Voltmeter:

Five Ranges.....0-10, 0-30, 0-100, 0-300, 0-1000 volts
Sensitivity.....1000 ohms per volt

Ohmmeter:

Six Ranges.....0-1000, 0-10,000, 0-100,000 ohms
0-1, 0-10, 0-1000 megohms

**All brand new,
first quality,
factory-sealed car-
tons, less batteries.**

\$39⁵⁰

Kit of batteries \$2.50

IN STOCK FOR IMMEDIATE DELIVERY

**NOTE: Price Net, F.O.B., N.Y.C.
and subject to change without notice.**

USES

The RCA Battery VoltOhmyst is a combined voltmeter-ammeter-ohmmeter of the electronic type for use in places where the conventional a-c outlet is not available. Internal battery operation of this VoltOhmyst makes it entirely independent of external power sources. It can be used in automobiles, boats, airplanes, rural areas and any other place where the regular a-c power supply is either difficult or impossible to obtain.

The Battery VoltOhmyst may be used for accurate measurements of a-c and d-c voltage, for d-c current and for resistance. In radio and audio applications it may be used for measuring AVC, AFC and FM discriminator voltages; d-c supply and bias cell voltages; oscillator strength; and resistance of coils, resistors, and insulation. This VoltOhmyst is quite helpful for measuring the d-c voltage developed across the picture channel of a television receiver when making antenna adjustments. It also is applied to determining when gassy tubes are present. D-C measurements may be made when a-c is present. In addition, this Battery VoltOhmyst is a useful tool for the servicing of all types of modern industrial electronic equipment.

D-C Ammeter:

Six Ranges.....0-3, 0-10, 0-30, 0-100, 0-300 milliamp.
and 0-10 amp.

Voltage Drop.....450 mv. for full scale deflection

Power Supply:

Batteries.....Four 1 1/2 volt RCA-VS036
Two 45 volt RCA-VS035

Tube Complement.....2 RCA-1CSGT, 1 GE-NE51

Dimensions.....9 1/2" high, 6 1/4" wide, 5 1/2" deep

Weight.....9 lbs. (incl. batteries)

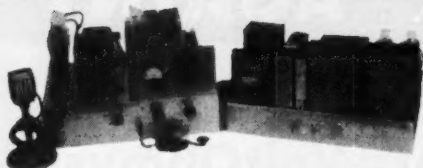
Shipping Weight.....12 lbs. (incl. batteries)

Telephone:  LUXemburg 2-1500

HARVEY
RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

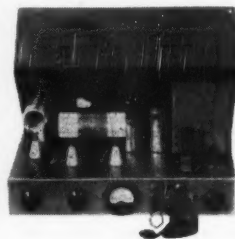
HARVEY presents the ELDICO Line



TR-1 TRANSMITTER KIT

A conservative 300-Watt phone and c.w. rig 6V6-6V6-6L6-813, Class B 811 modulators. All bands, 80, 40, 20, 15, 11, and 10. Exciter broad band, single control PA tuning. Three power supplies delivering 1500 v.d.c. at 350 ma, 500 v.d.c. at 200 ma, and bias supply. Aluminum chassis, tubes, transformers, capacitors, resistors, antenna changeover relay, meter, wire, hardware and coils included. Electro-Voice 915 high level crystal microphone part of the package. Plug in the crystal and line cord and you're on the air.

Only \$179.50 cash or \$89.50 down payment plus six monthly payments of \$15.75.



TR-75 TRANSMITTER KIT

Loafing along at 75 watts this is the c.w. man's buy of the year. Simple enough for the beginner to assemble. Uses the time proven 6L6 oscillator-807 amplifier combination. Pi-network out-

put. Husky power supply delivers 600 volts to the 807. Complete . . . not another bolt or wire to buy, including a smartly styled shielded cabinet to minimize television interference. Unbelievably low priced at.....\$34.95

GDA GRID DIP OSCILLATOR

The most valuable piece of test and measuring equipment in the ham's shack would be the grid dip oscillator. The "Grid-Dipper" has taken the country by storm. Amateurs using it have saved countless hours in building, improving and de-bugging rigs. The GDA kit builds an exact duplicate of the Grid Dipper and includes everything from the special handy case permitting one-hand operation, down to a complete application and instruction book. Complete with tube and internal power supply, range 3 mc to 250 mc covered in six steps, size 5 1/2" x 2 3/8" x 3".....\$21.50



NOTE: All prices on both pages are Net, F.O.B. N.Y.C. and are subject to change without notice.

ELDICO of N. Y., Inc.

41-31 Douglaston Pkwy.
Douglaston, L.I.

BAyside 9-8686

Flushing 7-9173

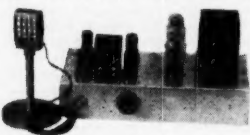
Transmitter Kits — top quality components — complete to the last piece of wire at rock bottom prices that can be paid off monthly!



MD-100 MEDIUM POWER MODULATOR

100 watts of audio, this AM modulator is designed to be assembled once and put into action . . . with

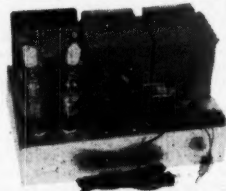
no maintenance problems. Lineup consists of a 6SJ7, 6J5 audio amplifier driving a pair of 6J5s which drive two 807s. It is an ideal modulator for the quarter kw c.w. rig and is another Eldico complete package. There isn't another thing to buy, it even includes an Electro-Voice 915 crystal microphone. At the low price of \$44.95 this is the kind of postwar price the hams have been waiting for. Speech clipper, if you want it, \$14.70 additional.



MD-40 LOW POWER MODULATOR

40 watts of audio, the MD-40 is a kit of the same superior parts that go into its bigger counterpart, the MD-100. In place of the 807s, two 6L6s are used. Complete, including the same standard communications Electro-Voice 915 high-level crystal microphone, only.....\$29.95

HV-1500 HIGH VOLTAGE POWER SUPPLY KIT



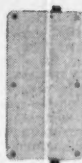
Here is a power supply that is designed to take it. Ultra-conservatively rated, will deliver under continuous service load 1500 v.d.c. at 350 ma. Kit includes plate and filament transformers, two filter capacitors and filter chokes, bleeder, safety plate caps, and all additional hardware, less 866 rectifier and chassis. The total cost is what you would expect to pay for the transformer alone. Complete kit price.....\$29.50

Telephone:  Luxemburg 2-1500

HARVEY
RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

of Transmitter Kits and TVI Filters



Transmitter
Dual Filter
—TVT-62—

At the Hudson Division Convention over 3,000 radio amateurs saw our TR-1 300 Watt Phone and CW transmitter using our dual TVI filter operating on 10-meter phone 26,686 KC and simultaneously watched the World Series—Channel #2 on television.

Measurements by certified equipment on amateur transmitter using our dual filter operating on 11 meters (the worst possible band for TVI) showed a fundamental signal strength of 612,000 microvolts per meter, with no measurable second harmonic. This was not a relative test, but a certified measurement using the latest RCA Field Strength Meter and recorded in actual Government records.

Come in to Harvey or Eldico. Either store will give you an actual demonstration. Come in and prove to yourself it really works.



Television Receiver Filter
Available—TVR-300 For Twinex
TVR-62 For Coax

HERE'S HOW WE DO IT

W2UOL's Eldico has gathered together all of the dope on TVI-ing, all of the data written by experts and then with Eldico engineers collaborated, rewrote, tried and experimented and compiled their own "TVI Can Be Cured" booklet. It's now coming off the presses and available free for just a penny postcard requesting it. Available in quantity for clubs and organizations. Be sure to get your free copy before they are exhausted. Write either store.

LICK TVI—FOUR WAYS

1. By complete shielding to prevent direct radiation from the transmitter.
2. By the use of line bypasses and brute force line filters to prevent kickback through the AC lines.
3. By the use of W2GX's M derived Low Pass Filter to prevent radiation of harmonics through the antenna.
4. By the use of W2GX's M derived High Pass Filters to prevent the overloading of the front end of the television receiver by amateur fundamental signals.

HERE ARE THE TOOLS

- Transmitter Dual Low Pass Filter
40 Mc cut off—over 75 db harmonic attenuation. 52-72 ohm input and output. For use at other impedances use an antenna tuning network. Good for 1 KW input—Negligible fundamental attenuation. No effect on antenna performance.
Model TVD-62 \$ 7.99 in kit form
Coax Dual Filter 10.99 wired and tested

- Receiver Hi Pass Filter
40 Mc Cut off—No attenuation to signals above 40 Mc. Efficient on any manufactured set. Will not affect picture, quality or strength. Available for coaxial or twinex installation.



TVR-300 for Twinex... \$1.98 in kit form
TVR-62 for coax... 3.98 wired and tested

- Brute Force Line Filter
Similar to ARRL's—Page 508 ARRL Handbook 1949 Edition. Will handle 1 KW—Completely filtered and shielded.

\$5.98 in kit form
8.98 wired and tested
(Add 25c To Cover Packing and Shipping Each Filter.)

- R.F. Shielding—Copper Mesh
The same type as we used in our TVI-Proofed TR-1 shown at the ARRL's Hudson Division Convention. Heavy Duty—tightly wound—It's expensive but the only thing we know which will do the job. Minimum order—3 sq. ft. 36" wide lengths. Per Sq. Ft. \$9.85 plus \$5.00 shipping charge regardless of quantity.

- Shielded Cable
Multi conductor—To reduce radiation via power leads, all cables must be bypassed and shielded. 2, 3, 8 and 9 conductor shielded cable available—220 wire 600-1000 volts insulation.
2 conductor .07 per ft. \$5.00 per 100 ft.
3 conductor .08 per ft. 4.25 per 75 ft.
8 conductor .15 per ft. 12.00 per 100 ft.
9 conductor .16 per ft. 12.50 per 100 ft.

- R.F. Bypasses
All AC Leads, power leads, relay and switch leads and every connection between chassis should be bypassed. Use

All in stock for immediate delivery.

our Hi voltage Ceramic for Hi Voltage, our button or feed thru's for medium and low voltages, our micas for AC, relay and switch leads.
HI VOLTAGE CENTRALAB 7500V working—50 MMFD. Tapped for 6/32 screws—The best for RF bypassing—\$8.99 each.

BUTTON CONDENSERS—available in various ranges and capacities. Automatically grounded through mounting screws 50, 100, 180, 500 MMFDS. \$15 each \$1.90 per dozen 2400 MMFD 23 each 2.50 per dozen
FEED THRU CONDENSERS. Just insert in hole in chassis, tighten nut and you have a feed through connection which is automatically bypassed to ground. Available in 50, 55 and 75 MMFD with nuts. 15c each—\$1.25 per dozen. Ceramic Condensers—Axial type—Temperature compensated. Ideal for usage in small spaces—Available in 2.2, 3, 5, 15, 25, 50, 100 and 300 MMFD \$1.5 each 1.25 per dozen

R.F. BYPASSING COMBINATION #1

Enough to do a thorough job on any amateur transmitter—Contains 6 Hi voltage ceramics, 20 button 30 feed throughs and 20 ceramics. A \$16.00 combination for \$8.95 per kit.

SHIELDED CABLE—COMBINATION #2

Contains 25'—2 conductor shielded Cable, 25'—3 conductor Cable and 25' of 8 or 9 conductor cable (your choice). A \$8.55 combination for \$6.95

TRANSMITTER FILTER COMBINATION #3

Contains one TVT-62 Dual Transmitter Filter, two TVR Receiver Filters (Your choice of 300 or 62 ohms) and one Brute Force Line Filter.

A \$17.99 combination for \$14.98 in kit form
A \$27.93 combination for \$22.50 wired and tested

COMBINED COMBINATION

Contains combination 1, 2 and 3 plus 12 square feet of H.V. duty copper screen—It's all of the material to really clean up the Kw rig.

A \$41.58 combination for \$35.00 in kit form
A \$49.10 combination for \$39.00 wired and tested

Telephone: 730rc Luxemburg 2-1500

Harvey
RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

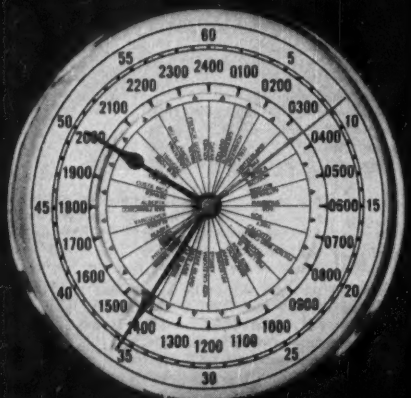
ELDICO of N. Y., Inc.

41-31 Douglaston Pkwy.
Douglaston, L. I.

BAyside 9-8686

Flushing 7-9173

Want to
SIMPLIFY DX LOGGING?
DRESS UP YOUR RIG?



This is the
2400-HOUR CLOCK
you've been waiting for

Every feature the Ham requires:

- Electric, self-starting
- World-wide time — shows time directly in every Time Zone
- Easily adjusted to any Zone
- Big 10-inch dial, lithographed in color (key cities clearly shown)
- Sweep second hand; chrome plated bezel
- A.C. operated — 110 volt, 60 cycle
- Wall or panel mounting

Imagine how easy and pleasant this will make DX logging. Sold through authorized dealers only. If your dealer doesn't have them yet, send us his name — or write for name and address of nearest authorized dealer.

Timing Devices Co.

Springfield, Massachusetts

SUPPLIERS: Write us for details immediately.
Your customers will be looking for this clock!

(Continued from page 86)

Mon.-Fri., 5NXX, manager, IUN: 3540 kc., 1900, Mon.-Fri., ZJO manager, C8SN 3560 kc., 1830, Mon.-Fri., LZY manager. On November 6th hams from Colorado, Wyoming, Nebraska, and Kansas converged on Greeley, Colo., for a very fine hamfest. Sixty-six hams were registered and many brought their families along. The surprise of the day was the personal appearance of Edna, the loyal 75-meter SWL, thanks to the efforts of DD, our Director. Several were interviewed by KFKA on tape recording and the boys heard it on their way home that evening. IQZ and 71RX were surprised to run into each other after twelve years. They were old orchestra associates "back when." Several fine prizes were donated and yours truly, true to form, won nothing. ZJO's traffic total is down somewhat this month because of elk-hunting QRM. IC is planning a very fine c.w. emergency net and a Denver 10-meter phone emergency net. KHQ reports 75-meter emergency net shaping up well. OWP and LZY are new OBS. Congratulations to LIP for a very fine hamfest at Greeley. He plans to make it an annual affair. Traffic: W0ZJO 443, IC 243, SGG 36, DYS 34, LZY 33, OWP 10, KHQ 2.

WYOMING — SCM, Marion R. Neary, WTKFV — Wyoming's "Pony Express" 75-meter phone net operates on 3920 kc. at 0930 Sundays. Stations in northern and western Wyoming are needed badly. 144-Mc. activity is increasing, with OWZ at Cheyenne and MVK at Laramie looking for out-of-State contacts. The Cheyenne Club meets the first Wednesday evening and the Laramie Club on the first and third Friday evenings. Secretaries of other clubs are asked to send in their meeting nights. HDS has been appointed SEC. All other appointments are open. Information and application blanks will be gladly furnished. GOH is mobile on 3.85 and 28 Mc. IRX and CGK are mobile on 3.85 Mc. Wyoming was well represented at the Northern Colorado Hamfest at Greeley, Nov. 6th. Thanks, gang, for honoring yours truly with the office of SCM. Don't forget to forward your activity reports.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Leland W. Smith, W4YE — The Alabama Emergency Phone Net turned in a fine performance during the October Simulated Emergency Tests, with LEN doing his usual fine job as NCS. Montgomery has an active 23-Mc. emergency phone net meeting twice weekly on 29,520 kc. MAK is new EC in the Birmingham area. EW still is building super-gain TV antennas on his ham rotary mount. PXO is a new YL ham in Fairfield and is convalescing from polio. GJW has new Collins 32V-1. JYB is new OO in Montgomery and has ART-13 installed in new car. DYM got his Class A ticket and promptly opened up on 14-Mc. phone with 500 watts. NQK and DFE still are going strong on 23 Mc. MEP, GHP, and PSS are mobile members of the Anniston AEC net. LDX, EW, HVY, CNQ, and YE are active 23-Mc. mobile stations in Montgomery. BCU has finished building his TV set and is returning to 4 Mc. AUP works 160-meter phone until sundown each day. IQN and MFA finally are getting out of town on 4-Mc. mobile. New EC appointees are wanted in Alabama! Send your request directly to your SCM who will forward it to your new SEC for action. Traffic: W4GJW 74, JYB 38, MAK 21, LEN 19.

EASTERN FLORIDA — SCM, John W. Hollister, W4FWZ — Field Day reports were slim. Miami, West Palm Beach, and New Port Richey reported. NFY and the AEC group at Miami ran up 1100 points in two hours of operation. At West Palm Beach there were MVJ, JQ, TH, BHN, IUJ, LXV, and OBW and it was so good the local Red Cross ordered exact crystals for 7 mobile rigs. KJ sent in a news clipping on Field Day. Traffic nets can use more c.w. members and speed is no requirement. Operators are needed for Jacksonville, Orlando, St. Petersburg, all east coast towns, and central Florida. Everyone is welcome. Make it as often as possible. Time: 7:30 p.m. Mon.-Fri. on 3675 kc. Listen for "CQ Palmetto." Why not exchange greetings by amateur radiogram? Get in the net. The phone net on 3940 kc. at 7 a.m. needs more coverage but is doing a good job. Clearwater: AXX is building low-power rig for 160 meters. Holly Hill: OAV plans on going to KL7 QTH with CAA. Lakeland: NAK rebuilt his 28-Mc. rig, has more power on 3.85 Mc., and is working on 144-Mc. rig. He has an RME VHF receiver. Miami: GHP reports all traffic handled by phone patch. ILE is building bandswitching inter rig consisting of VFO, 6L6, 6L6; 2 807s in parallel, 100 watts; folded dipoles for 10-11, 15, 20, 40, and 80; and is "all set for contests." New Port Richey: KJ reports that Edwin J. Ruth, ex-SCCW, of Tarpon Springs, died of a heart attack Oct. 13th. Tampa: AXY has 3 1/2-kw. a.c. unit and 34-kw. a.c. unit for emergency work. Doc says the new 10-20 rig has all ideas incorporated to get rid of TVI. West Palm Beach: PVZ is a new YL in Lake Worth. OBW has VFO for mobile. MVJ has 80 and 40 dipoles fed with RGSU and ground plane on 28 Mc. Traffic: W4IQV 117, MVJ 108, GZV 100, RP 56, OAV 39, GHP 31, LMG 26, KJ 25, NAK 9, DES 8, FWZ 3, ILE 3.

WESTERN FLORIDA — SCM, S. M. Douglas, Jr., W4ACB — We still would like to hear from the gang in Panama City, Blountstown, Perry, Madison, and others.

(Continued on page 94)

NEW

1950 EDITION

The Radio Amateur

HANDBOOK

Available January



\$2.00 *U.S.A. proper.*

\$2.25 U.S. Possessions and Canada, \$2.50 Elsewhere

Buckram Bound Edition \$3.00 U.S.A. proper, \$4.00 Elsewhere



American Radio Relay League

West Hartford, Connecticut

HAPPY NEW YEAR BARGAINS from THE RADIO SHACK!

**NEVER BEFORE OFFERED BY US
TO OUR QST READERS!**

**Your PE-103 Troubles Are Over!
We Have 6 Volt Dynamotors
(CARTER Magmotors)**

For ONLY

- List Price \$57.50
- Not War Surplus!

\$995



What a buy for \$9.95 — 6 volt Carter Magnmotors that are FIVE TIMES LIGHTER than PE-103 and over ¼ its size! These are 5½x3½x2½" and weigh only 5 lbs. Here's the PREFERRED power supply for mobile rigs, taxicabs, police cars, radio, small aircraft transmitters, etc. Permanent magnet field design, small drain: ball-bearing equipped. Input 5.5 volts at 19 amps, output 400 volts at 150 ma. 6500 rpm. We repeat: these dynamotors are practical . . . NOT war surplus . . . and have a list price of \$57.50. This is a Radio Shack EXCLUSIVE, and quantities are LIMITED! NEW, but may show some slight signs of handling.

New! Not War Surplus!
Heavy Duty POWER TRANSFORMERS
SEE THE LIST PRICE ON EACH!

Brand new power transformers in battleship gray enameled potted metal cases, with porcelain high voltage terminals. Conservatively rated — will handle much larger than stated capacities. Mount upright or inverted. Excellent for ham rig, ex-perimenters, broadcast stations. Available in two ranges, both with input of 115/160:



2600-0-2600 AC at 550 ma (ICAS) — size 7 $\frac{3}{4}$ x7 $\frac{3}{4}$ x8 $\frac{1}{2}$."
 Weight 50 lbs. LIST Price \$150. OUR PRICE only \$29.95
 1750-0-1750 AC at 550 ma (ICAS) — size 6 $\frac{3}{4}$ x8x7 $\frac{3}{4}$."
 Weight 37 lbs. LIST Price \$100. OUR PRICE ONLY \$18.95
 NOTE: add 50c ea. for wooden crating of above transformers.

Components For Heavy Duty Transformers:

866 tubes, each	99c
60 sec. Time Delay Relay (Paragon) for filaments of	
866 tubes	
0-150 VAC 2½" rd. Burlington 522 panel meter, brand	\$4.25
new!	
0-1 DC mils 3" rd. 31B as above	\$3.25
	\$3.95

NEW DELCO (G-M) DUAL AC BLOWERS

**ONLY**

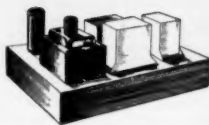
\$14.85 Ea. lots of 1-9
\$13.95 Ea. lots of 10-49
\$12.75 Ea. lots of 50-99

New and in original shipping cartons! Way, way, way below regular price! Built by Delco division of General Motors. Million household, commercial and marine uses: photo dark-rooms, cooling xmr tubes, furnace draft boosting, machinery rooms, cooling humidifiers, hair dryers, kitchen ventilation, etc. suction unit, humidifiers, hair dryers, kitchen ventilation, etc. No brushes to cause shaded-pole motor with skewed squirrel-N 115 V 60 cycle Delco shaded-pole motor with skewed squirrel-cage type rotor. Two-piece snail type housing. Die cast alloy pressed-steel welded 2-piece snail type housing. Die cast alloy, case and housings. Operates at 2800 rpm; 2750 fpm velocity 120 cfm free volume air delivery. 62 watts input. Black lacquer finish. Weight 11 lbs. Over-all 10 21/32" by 5 27/32" by 6 7/32", with universal mounting brackets. It's the blower-buy of all time!

**SAVE \$10 On This 400 VDC @
160 Mils Power Supply Kit!**

Should be
\$17.45
YOURS
for only

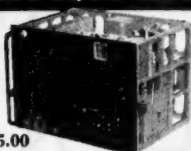
\$745



Designed for rcvr's, xmtrs, testers, oscillators, preselectors, monitors, amplifiers and other applications requiring a well filtered supply. Kit includes: power transformer, choke, two 10 mfd at 600 V oil-filled condensers, 574 rectifier tube, octal socket, 7x11x2" aluminum chassis, and line cord! Gives a well-filtered supply of 400 VDC at 160 ma with less than 1% ripple. Has secondary voltages of 6.3 V at 4.2 amps; 5 V at 3 amps. And best of all — Happy New Year savings of 10 whole bucks! Only \$7.45 complete.

COLLINS TCS EQUIPMENT

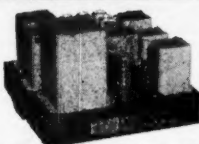
**MODEL 51-Q
RECEIVER
Only \$49.50**



Worth over \$175.00

... beautifully constructed in the famous COL-
LINS communications manner. Perfect replacement
for your SHIPBOARD or SHORE RADIO
station, also for HAM communications receiver.
Seven tubes — 3 — 12SK7, 2 — 12A6, 12SQ7,
12SA7. Precision tuning in 4 ranges, 1.5 mc to
12 mc. CW pitch control; separate RF and audio
gain controls; slug-tuned i.f.s. Input 12 VDC.
Overall 13½x10x10". Weight 30 lbs. COMPLETE
with tubes (uses external power supply). BRAND
NEW, and the supply is LIMITED.

AC XMTR/RCVR POWER SUPPLY

**Only \$99.50**

**Worth
over \$250.00**

Built by COLLINS, meaning "battle ship" like a battleship! A well-filtered dual supply for TCS xmtrs and revrs (see above) or for many other uses. Can be used on either 220 OR 110 VAC INPUT! Output supplies 500 V @ 250 mila for xmtrs, and 225 V @ 100 mila for revrs. Complete with 4 rectifier tubes — 2 — 5R4GY, 2 — 6X5GT. Relay controlled. Overall 17x16x16. Weight 100 lbs. **BRAND NEW IN ORIGINAL PACKING.**

**FREE 138 pg. CATALOG and
SURPLUS BULLETIN**

The RADIO SHACK Corp.

CABLE ADDRESS · RADIOSHACK
167 WASHINGTON ST., BOSTON, MASS., U.S.A.

\$87.50 VTVM FOR \$39.50! SENSATIONAL PRICE CUT ON RCA WV-65A VOLTOHMYST!

RADIO SHACK SCOOP! FOR HAMS, SERVICEMEN, LABS! HURRY — LIMITED QUANTITY!



**SAVE \$48.00
OVER 1/2 OFF!**

\$39.50

**Battery Kit
\$2.52 EXTRA
IF DESIRED**

GUARANTEED!

**ORDER BY MAIL,
ORDER TODAY!**

The Battery VoltOhmyst is a push-pull VTVM with 2-tube bridge circuit, possessing excellent linearity and stability characteristics. Circuit innovations that include zero grid current and controlled inverse feedback produce accurate readings over all ranges.

A 1-meg. shielded signal-tracing probe makes possible dynamic voltage measurements in signal-carrying circuits. The WV-65A is exceedingly stable in operation, requires no adjustment of zero controls when changing ranges and is essentially independent of changes in both tube characteristics and battery voltages during normal life. A neon lamp mounted on the panel flashes whenever the battery is on. This indicates the condition of the battery, and reminds one that the instrument is on.

The Battery VoltOhmyst may be used for accurate measurements of a-c and d-c voltage, for d-c current and for resistance. It may be used for measuring AVC, AFC and FM discriminator voltages; d-c supply and bias cell voltages; oscillator strength; and resistance of coils, resistors, and insulation. This VoltOhmyst is quite helpful for measuring the d-c voltage developed across the picture channel of a television receiver when making antenna adjustments. It also is applied to determining when gassy tubes are present. D-C measurements may be made when a-c is present.

D-C Voltmeter:

Six Ranges 0-3, 0-10, 0-30, 0-100, 0-300, 0-1000 volts
Input Resistance 11 megohms constant for all ranges
Sensitivity (max.) 3.7 megohms per volt on 3-volt range

A-C Voltmeter:

Five Ranges 0-10, 0-30, 0-100, 0-300, 0-1000 volts
Sensitivity 1000 ohms per volt

Ohmmeter:

Six Ranges 0-1000, 0-10,000, 0-100,000 ohms,
0-1, 0-10, 0-1000 megohms

D-C Ammeter:

Six Ranges 0-3, 0-10, 0-30, 0-100, 0-300 milliamp. and 0-10 amp.
Voltage Drop 450 mv. for full scale deflection.

Power Supply:

Batteries: Four 1 1/2 volt
Two 45 volt

Tube Complements

2 RCA-1CSGT, 1 GE-NE51

9 lbs. (incl. batteries)

The RADIO SHACK Corp.

CABLE ADDRESS: RADIOSHACK
167 WASHINGTON ST., BOSTON, MASS., U.S.A.

QST BINDERS

**HANDSOME
PRACTICAL
USEFUL**



- Holds 12 Issues of QST
- Opens and lies flat on any page
- Protects and preserves your copies
- QSTs always available for reference

With each Binder is furnished a sheet of gold and black gummed labels for years 1940 through 1960. The proper one can be cut from the sheet and pasted in the space provided for it on the back of the binder.

Price \$2.50 postpaid

Available only in United States and Possessions

THE AMERICAN RADIO RELAY LEAGUE
West Hartford, Connecticut

(Continued from page 90)

How about it, gang? LDT and ACB visited Pensy and had an FB time seeing the gang. MS is sporting AF4MS call since joining the MARS. Dits and dabs are flying thick and fast in Pensy now that it is in the Class B zone. OCL had a nice QSO with IAMO and IQCS. AMO and OCL were both mobile in motion and QCS fixed, all on 28-Mc. phone. PTK is the latest call in Pensy and he's knocking holes in 7 Mc. NJB is getting 50-Mc. rig ready. JNN is a tree-cutting party recently at his QTH. NFN is the proud possessor of a jr. YL. Congratulations! OKD is getting primed for CAA radar work. TL and QB were SS rivals. DAO has moved back to his old QTH in the city. ACB has gone back to work for the City of Tallahassee. Let's have some more reports, fellows. Traffic: W4OKD 185, AXP 53.

GEORGIA — SCM, Clay Griffin, W4DXI — Georgia lost one of its well-known hams with the death of BTI in October. Lynne will be greatly missed by all of us on the 75-meter phone band. The Georgia-South Carolina Net meets at 7:15 and 9:30 on week nights. All interested c.w. hams are urged to call in. The frequency is 3525 kc. The Georgia Slow Speed Net still is going strong on 3582 kc. and will welcome new members. Valdosta: BQT is back on 7 Mc. APS has increased his power on 14 Mc. KGI has 150 watts on 3.5 Mc. An amateur radio booth was set up at a local fair. NZX, of Macon, is a 14-year-old YL operator with a Class A license. She is the daughter of ILZ. BQU has no antenna for low frequencies, but has been on the high frequencies. GGD has been handling traffic and is rebuilding. AD had an appendectomy at Port Royal, Va., on his way home. MA has been trying 28 Mc. FKE has had power-supply trouble. BPT is getting back on. BIW has had good success with a new 28-Mc. beam. BIN joined WCON, making a total of five hams working for that station. KV should be back on soon with a new rig. Traffic: W4BVK 32, BOL 36, KJ 23, GGD 20, DXI 6, BIW 3.

WEST INDIES — SCM, Everett Mayer, KP4KD — DJ, the EC, and HZ, Asst. EC, keep 3.5-Mc. c.w. and 28-Mc. phone nets going strong. JE graduates to 50 watts after working 48 countries with 6 watts. FN made his 100th contact with W1OKH. Fourteen AEC members participated in the Simulated Emergency Test and AEC net participation is on the upward trend. DJ's schedule with W2BYF on 3710 kc. still is hitting on all 8. W4OLC visited his OM, KD, and friends. W2CKL, HZ's sister, received her license while visiting P.R. IN visited Kansas City and AZ is on a 2-month vacation. The Roosevelt Range gang is active as is the Rainey gang, headed by IT. W2DD and W6AWA are in P.R. with the Duffy's Tavern crew. ID is overhauling the big rig in preparation for working all bands, c.w./phone. JU is on with QRP and getting out. CH is with WIBS and WITA with DU and AU for bosses. Traffic: KP4DJ 34, KD 5, KO 3.

CANAL ZONE — SCM, Everett R. Kimmel, KZ5AW

— PA, new RM, is polishing up procedure and teaching new QN signals to Crossroads Net members each Tuesday at 2100 on 7150 kc. AW, BL, CO, DE, DR, GD, and WJ have discovered that net procedure and problems can be very interesting. It's a slow-speed net. The welcome sign hangs out every Tuesday at 2100. WJ and RM qualified for OO, Class I, with GD now giving the section three frequency experts available for VFO and crystal checks. WJ has been appointed OBS, Pacific-side, with 7- and 28-Mc. schedules. GM adds Gamboa to the roll of towns checking into Monday night AEC drills. GM and PC acquired Collins VFOs. CP and IP are DXCC. AW, GM, PA, PC, and WJ, plus two hams-to-be, came home from a week end of Perles Island fishing loaded with 300 lbs. of shrimp, a refrigerator full of fish, and a water-stained copy of QST. Traffic: KZ5FL 54, PA 38.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Vincent J. Haggerty, W6IOX — Asst. SCMs, William J. Schuch, 6CMN, and Irvin O. Hege, 6FYW. SEC: ESR. Speaking at the November meeting of the Long Beach Club was EUV, an attorney, who addressed the members on the legal aspects of amateur radio. The Activity Committee of the Long Beach Club stirred up member interest in the ARRL Sweepstakes Contest. At meetings of the Pasadena Short Wave Club a technical symposium is held in which written questions of a technical nature are submitted to a panel of experts for discussion. 7M2C/6 is stationed at March Field and is interested in v.h.f. work. ZUX worked HC2OT on 50 Mc. on Oct. 16th. HJL is trying for WAS and lacks 7 states. FYW is active in new CARS set-up and wants former AARS members in Southern California to contact him. OLO worked LU9MA on Oct. 29th on 50 Mc. AM got in some traffic work by relaying Simulated Emergency traffic direct to W1AW. BHG decodes a seeming dearth of active stations on 144 Mc. JQB is getting in more time in traffic work. CMN plans to organize a slow-speed net. CE, YLZ, and DDE made the BPL. The National Traffic System is developing nicely with a good number of stations in the section participating. UXN has a new mobile receiver set-up and p.p. 4-65s mobile on 50 and 28 Mc. The VHF Net has changed its meeting to 8 p.m. Thursdays on 147.5 Mc. All interested in rag-chewing are invited. WKO is Net Control. Phone

(Continued on page 96)



Can You See Your Future in TV?

Today the cathode ray tube can be the crystal ball that forecasts your future. Is the picture clear and bright — or is it fuzzy and out of focus?

Are you going to learn *now* how to install and service all types of TV and FM receivers? There can be no doubt that TV is the important field for greater earnings: 83 stations on the air (many more authorized); two million new sets in 1949; twelve million predicted by 1953; practically every area in the nation soon to be in range of a TV station. Technicians with specialized TV-FM training will inevitably have the inside track installing and maintaining all these sets.

CREI offers just the specialized training you need. It's a streamlined course for the top third of the men in the field — thorough and complete. It gives practical answers to the technical problems you run into while servicing today's intricate

TV and FM equipment. It is up to date, constantly revised to cover new developments as they are adopted by the industry.

Start your training now and apply your knowledge immediately. The profitable work, passed up yesterday because it was over your head, can be yours tomorrow. Make this year the turning point in your TV career! Write today for complete FREE information. The cost is popular, the terms easy.

(Veterans: CREI training is available under the G.I. Bill. For most veterans, July 25, 1951 is the deadline—act now!)

FREE LESSON! "Television and FM Trouble Shooting" — this lesson is devoted to live, "dollar-and-cents", practical practice based on day-to-day servicing problems. Read this interesting lesson and see for yourself how CREI training can help you. Mail coupon for this sample lesson, free booklet and details.

THE THREE BASIC CREI COURSES:

- ★ **PRACTICAL RADIO ENGINEERING**
Fundamental course in all phases of radio-electronics
- ★ **PRACTICAL TELEVISION ENGINEERING**
Specialized training for professional radiomen
- ★ **TELEVISION AND FM SERVICING**
Streamlined course for men in "Top-Third" of field
Also available in Residence School courses

CAPITOL RADIO ENGINEERING INSTITUTE

An Accredited Technical Institute Founded in 1927

Dept. 161B, 16th Street & Park Road, N. W.
Washington 10, D. C.

Branch Offices:

New York (7) 170 Broadway • San Francisco (2) 760 Market St.

Capitol Radio Engineering Institute

Dept. 161B, 16th & Park Rd., N. W. Washington 10, D. C.

Gentlemen: Send me FREE SAMPLE LESSON and complete details of the TV and FM Servicing home study course. Also send brochure that explains the CREI self-improvement program and gives complete details and outline of course. I am attaching a brief resume of my experience, education and present position.

- CHECK FIELD OF GREATEST INTEREST
- ☐ TV, FM & ADVANCED AM SERVICING
 - ☐ PRACTICAL TELEVISION ENGINEERING
 - ☐ PRACTICAL RADIO ENGINEERING
 - ☐ AERONAUTICAL RADIO ENGINEERING
 - ☐ BROADCAST RADIO ENGINEERING (AM, FM, TV)
 - ☐ RADIO-ELECTRONICS IN INDUSTRY

☐ I AM ENTITLED TO TRAINING UNDER G.I. BILL

NAME _____ AGE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

☐ SEND DETAILS ON RESIDENCE SCHOOL

LOOK

35-FT. MAST KIT

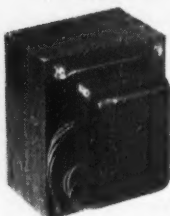


Signal Corps type. Slightly used. Kit has seven 5' 6" sections of 1 1/2" o.d. steel tubing, heavy 1/16" sidewalls, green enameled finish. One end of each tube is ferruled 6" for tight fit into next section.

An inexpensive, sturdy, portable antenna mast or vertical radiator. Easy to erect. Complete with heavy canvas carrying case with sections for each tube and wrap-around straps. 6 ft. length overall. Total weight 45 lbs. Complete.

Limited \$9.95
Quantity

DUAL PLATE XFMR



815-0-815 volts, 250 ma., PLUS 385-0-385 volts, 65 ma., 115 volt, 60 cycle primary, electro-static shield, upright mounting, fully shielded. A beautiful transformer with many applications.

\$6.95

Limited Stock

5 1/4 x 4 1/2 x 3 1/2, 17 lbs.

BC-348 RECEIVER



EXCELLENT
CONDITION

\$109.50

Steinberg's

633 WALNUT STREET • CINCINNATI 2, OHIO

Activities Manager MVK reports 420-Mc. enthusiasts may look for contacts at 9 p.m. every night with FLX, CFL, VIX, NLZ, IFE, WWF, VNL, and KKG active. WUQ/6 is located on San Vicente Island with 90 watts to a 64-element beam on 144 Mc. ESR plans a Millen 6/2 transmitter and sixteen-element beam rotated with a TV rotator. PYN switches from 7 Mc. to 3.85 Mc. EAN is on 3.85 Mc. BBY is the new secretary of the Two Meters and Down Club. CQJ has a new HT-10 and NC-173 with a close-spaced beam on 28 Mc. DEB has a 522 on 28 Mc. ZUX is on 50 Mc. with 75 watts into an eight-element beam. DAY gave a novel antenna discourse at a recent Metropolitan Radio Club meeting. A bazaar by the Two Meters and Down Club attracted 15 XYLs and YLs. MVK's XYL baked the cakes. ESR walked off with the door prize — won it, that is. Proceeds of the cake sale augmented the club treasury. VHF please note: The Two Meters and Down Club voted unanimously to go to horizontal polarization by December 1st with the idea of improving DX contacts with stations in the East. Traffic: W6CE 2300, OX 381, YLZ 306, DDE 273, JQB 169, CMN 125, RXT 85, BHG 68, AM 56, TFC 42, QAE 22, MU 16, FYW 13, KXK 7, FMG 3, YSK 2, WMQ 1.

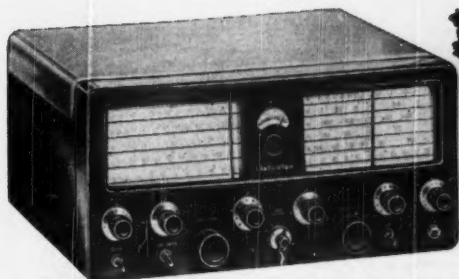
ARIZONA — SCM, Gladden C. Elliott, W7MLL — The Saguaro Club in Phoenix did a fine job of ham operation at the Arizona State Fair. The Radio Clubs of Tucson Junior High Schools deserve great credit for their operation of the Pima County Fair, with NPL as operator. The Governor's Aviation Committee and Weather Bureau requests amateur radio service for weather reports throughout Arizona. Drop me a card offering your services. New appointments: OPS — MOW, MID, KWB, KYN, and MJN. ORS — MID, OO — MAL and LBN. 9YSY/7 is on 28 Mc. at Sunnyslope. MUC, Maricopa, is working Phoenix stations on 28 Mc. over South Mountain and Globe line of sight. NWA is a new Phoenix call and is on 28 Mc. UPR and PEY, in Tucson, and KAD and PBD, in Douglas, held a 28-Mc. round-table. FG reports HGT on 50 Mc. R.N. at Casa Grande, is working LFX, in Tucson, on 14 Mc. PEY worked OH2OK, SV8WI, and F9QU/FM8 on 28-Mc. 'phone. BVZ gets the first postwar Worked All Arizona by presenting a QSL from each Arizona County. Meet the Arizona gang on 3515 and 3885 kc. nightly and 7200 at 10 a.m. Sundays. EAW is back on the air. UDI is handling Arizona traffic with western nets.

SAN DIEGO — SCM, Dale S. Rose, W6BWO — YXE, the new SEC, reports a rather poor turnout for the Simulated Emergency Test, but he is taking steps to remedy this situation. Also he took the Class A exam and expects to be all set for operation on the Class A 'phone bands soon. FMZ is running an 814 at about 150 watts and took in the last CD Party. ELQ turned in the best traffic total for the month. FTY, age 14, has his 25-w.p.m. Code Proficiency certificate. GQK has applied for EC membership. BGF has had to resign as RM because of lack of time for ham activities. YYN has applied for ORS and OO appointments and says that YYM, his XYL, would like the same. KW mailed out a report on the directors' meeting of Oct. 8th and of the FCC hearing on Oct. 10th to the hams in the San Diego section. The Orange County Club is trying to find ways and means to increase attendance at its meetings. Traffic: W6ELQ 61, FMZ 47, BAM 30, YXE 7.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, Joe G. Buch, W5CDU — IRZ has taken over the NCS assignment for the Northeast Texas EC 'phone net. Wilbur is most capable of carrying on with NTXE. We wish to thank CJJ for his interest and service to NTXE since its inception. Following the suggestion of our SEC, AAO, the three EC nets now operate on channels ten kcs. apart: NTXC is 3930, NTXE on 3940, and NTXW on 3950 kc. In addition, the SEC and NCS meet on 3960 kc. fifteen minutes before scheduled drill time to discuss net operation problems. The new National Traffic Plan is working very well and is a real help in traffic net operations. 4NNJ and 4LNN are doing fine as NCS for RN5, our regional terminus. BKH promises more activity since the nights are getting longer and the grass is getting shorter. For the 'phone operator who wants a bit of c.w. practice, BKH suggests you meet with him at 0730 on 3930 kc. by reporting into the EC c.w. net. BKS, of Fort Worth, is ex-2SKT and is active on 3.85-Mc. 'phone. As a result of having someone else dig the holes. BTU now has a couple of fifty-ft. poles for antenna support. LGY and her mother visited ATG. Helen reports Ed has a new rack and panel job. The Big Spring Club now has two transmitters operating for club and emergency work. Three fifty-ft. poles furnish the antenna supports. KUC is working lots of 14-Mc. DX. GZU makes BPL for the ninth consecutive month. Traffic: W5GZU 720, LSN 406, CDU 121, ARK 96, FXR 26, BKH 22, AW 19, AWT 10.

OKLAHOMA — SCM, Frank E. Fisher, W5AHT/AST — SEC: AGM, RM: MBV, PAM: ATJ, PNG has new SX-43 and 50-Mc. beam. JP is trying to put six 304TLs in one new rig. BLW has new mobile rig on 28 Mc. OWG now is Class A and has a kw. on 14-Mc. 'phone. EGR is building a 10- and 20-meter beam. New officers of Enid ARC are KWE, pres.; LHZ, vice-pres.; QGF, secy.; and Malvin (Continued on page 88)



hallicrafters SX-71

Ready Now! A New Type of Receiver Designed for Superior Ham Band Performance!

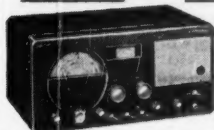
It's a Double-Superhet, with 2½ Kc "Nose" Selectivity, Built-in NBFM Reception and over 300-to-1 Image Rejection at 28 MC among its "extra" features. One RF, two Conversion, and three IF Stages provide plenty of sensitivity. Of course the SX-71 is temperature compensated and voltage regulated. And the clean-cut station separation is a dream of operating enjoyment. For Ham Performance, above all else, At Moderate Cost, this new receiver is "tops"!

Hallicrafters SX-71 Receiver, Complete with 11 tubes (plus rectifier and regulator), and cabinet. Less speaker. 18 x 8 7/8" x 12" D. 33 lbs.

No. A2095.....Net

\$179.50

Only \$17.95 Down—12 Monthly Payments of \$14.27



S-40A

\$79.95

with built-in Speaker

S-40A Receiver. Frequency range 550 Kc to 44 Mc. 4 Bands. One RF, two IF. 8 tubes plus rectifier. Internal speaker. No. A-2060.....Net

New Cash Price \$79.95

Only \$8.00 Down—12 Months at \$6.36

S-40AU, Universal Model No. A2069.....Net \$89.95

S-52, AC-DC Version No. A2078.....Net \$79.95



S-38A

\$39.95

with built-in Speaker

S-38A, Lowest Priced Real Communication Receiver on the Market! 548 Kc to 32 Mc Continuously in 4 Bands: Electrical Bandsread. Built-in Speaker. No. A2068.....Net \$39.95

SX-43
\$159.50

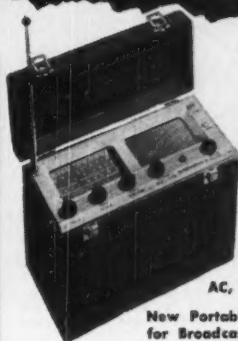
Less Speaker



SX-43, FM-AM Receiver. AM: 540 Kc to 55 Mc, FM: 44-55 Mc and 86-109 Mc. 7 Bands. 10 tubes plus rectifier. For 115VAC. Less Speaker. No. A2051.....New Cash Price \$159.50

Only \$15.95 Down—12 Months at \$12.68

**For CASH or CREDIT
Get Your
HALLICRAFTERS
From NEWARK**



**All-Wave
PORTABLE
RECEIVER
S-72**

\$79.95

Less Batteries

AC, DC or Battery • BC and SW

New Portable Communication Receiver for Broadcast or Amateur Use.

540 Kc to 31 Mc in 4 bands. Separate bandsread tuning. Loop and whip antennas. 8 tubes plus rect. Many deluxe features. Complete with tubes, less batteries.

No. A-2079.....Cash Price \$79.95

Only \$8.00 Down—12 Months at \$6.36

sky rider

**10" - 12" - 16" TV CHASSIS
for Custom
Installation**



**10" TV
CHASSIS**

Model 524

\$159.50

Complete with 10" Picture tube

Only \$15.95 Down—12 Months at \$12.68

10" TV with 10BP4 and Cab. (Model 513).....Net \$174.80

Only \$17.45 Down—12 Months at \$13.87

12½" TV Chassis, Model 521. Complete with 12½" tube.....Net \$189.50

Only \$18.95 Down—12 Months at \$6.23

12½" TV with 12LP4 and Cab. (Model 518).....Net \$214.50

Only \$21.45 Down—12 Months at \$17.05

16" TV Chassis, Model 520. Complete with 16" Tube.....Net \$249.50

Only \$24.95 Down—12 Months at \$9.32

16" TV with tube and Cab. (Model 519).....Net \$289.50

Only \$28.95 Down—12 Months at \$23.02

NEWARK
for
RADIO & TELEVISION

NEWARK ELECTRIC CO., INC.

**3 GREAT STORES! Uptown at 115 West 45th Street
and Downtown at 212 Fulton Street in NEW YORK
323 West Madison Street in the heart of CHICAGO**

**MAIL ORDER DIVISIONS: 242 West 55th St., N. Y. 19
and 323 West Madison Street, Chicago 6, Illinois**

Include Postage
All Prices F.O.B.
New York or Chicago
Enclose 20% Deposit
with C.O.D. Orders

READ THIS!

Here's what
fellow ops
say about the



ELECTRONIC MONITOR & KEY

Dale Hileman, W9CVX, Chicago

"As a graduation present I received from my parents a Mon-Key electronic key and monitor. During the time in which I have been using it, about three weeks, I have convinced at least four people of its merit, and converted them to potential purchasers of the key."

"The typical reaction of 'ham' ops, upon hearing code from the Mon-Key, has been, 'U sure got a FB fist, OM', or 'UR Mon-Key sounds like a tape. When I can scrape up 30 bucks, I'm gonna get me one.' I have had very good luck with the key, and I am sure that they will become popular among good operators all over the country."

F. L. Hammer, New Haven, Connecticut

"You may be interested to know about my success with the Mon-Key. Have been a marine operator for some time, going through life with a second class license. However, I recently got up enough ambition to go to New York and try for my first class license and in running through the 25 word per minute code tests I used my Mon-Key and ran through the tests with no slip-ups at all. This was the first Mon-Key that F.C.C. examiners had had up there and they were much interested in it."

W. C. Downes, W3UVD, Jeannette, Pennsylvania

"Here's some unsolicited praise for your Mon-Key. After three weeks of practicing to master its timing, I put it on the air and now really get some swell reports on my fist thanks to the Mon-Key!"

"Thought you would appreciate knowing what I thought of your product. I wouldn't trade mine for any other type or kind of key. Reasonably priced — one swell product!"

SEND FOR YOUR ILLUSTRATED MON-KEY FOLDER TODAY!

MON-KEY, Amateur Net, only \$29.95

If Your dealer can't supply you, send check for \$29.95 direct to us. Immediate shipment on Money Back Guarantee.

ELECTRIC EYE EQUIPMENT CO.

8 West Fairchild Street Danville, Ill.

EXPORT: HARRISON RADIO CORPORATION.

225 Greenwich St., N. Y. 7, N. Y., Cable Harrisrad



**RECEIVING SENDING
CODE Speed
without strain**

CHAMPIONS ENDORSE CANDLER WAY

Get skill, accuracy, speed with the highly endorsed Candler System. Learn to send and receive by telegraph or radio code. Government service and commerce need thousands of better trained operators. Air commerce, mail, freight, etc., demand expert, reliable operators. Good pay. Get the Candler System, the maker of champions. It teaches you the "knack" of sound sense, alertness, speedy sending and receiving without strain. Adventure — good pay. Learn at home or wherever you are. Rush name today for free book.

FREE!

CANDLER SYSTEM CO.

Dept. 4-A, Box 928, Denver 1, Colorado, U.S.A.
and at 121 Kingsway, London, W.C. 2, England

Langford, asst. secy. LHZ took part in Frequency Measuring Test with homemade gear with an error of 1 p.p.m. HXT has 304TTL perking. EHC has new modulation transformer for his 813 rig. NHD received OES appointment. AHT is back on the air on 3.5 Mc. The Lawton-Ft. Sill ARC is sponsoring two contests. A prize of a microphone or bug is offered for the first WAS. A contest for SWLs offers an expense-paid trip to the examination point for ham license to the first station hearing all states. QSLs are required. Participation in either contest is limited to club members and the contests run until someone wins. KVF has a new beam. FWX reports trouble with rotating folded dipole. A mobile net has been formed in Lawton; frequency is 29.600 Mc. A slow-speed section of OLZ has been established, meeting at 2000 Mon., Wed., and Fri., and operating at 15 w.p.m. or less. The National Traffic System is working fine but more relay operators are needed on OLZ. If your community does not have an active EC, contact AGM. Traffic: K5NRJ 516, W5OWV 307, MBV 230, NMM 145, FOM 133, OYP 43, AHT 36, GVS 34, ADC 12, EHC 7.

SOUTHERN TEXAS — SCM, Ammon O. Young, W5BDI — MDZ and JIV are on 28 and 144 Mc. EAL is in the CERN 144-Mc. net. IZB is on 28-Mc. mobile. EIB is back on with Signal Shifter while rebuilding the final. GRA has new ham shack and is now VFO on 14-Mc. phone. IHD is on 14-Mc. c.w. with 150 watts to an 814. IGS is mobile on 3.85, 28, and 144 Mc. OQF is on 7- and 14-Mc. c.w. NIT is putting the finishing touches on a super modulation rig which will have 807s in the final. EEX is back on 7 Mc. A5LSE is building 800-watt rig for MARS Net. OUG is experimenting with 144-Mc. high gain low-noise r.f. amplifiers. ADZ is building a three-element beam. KFY is building a new twelve-element beam for 144 Mc. ON is coming up with a new beam for 144 Mc. MN schedules 4PL in the a.m. on 7 Mc. NIT was in the CD Party. JKB has been working DX on 28-Mc. phone. PKX and NZH helped KSW put up his 14-Mc. beam. MWN is mobile on 3.85, 28, and 144 Mc. LGG spends most of his operating time in ragchewing. OQI now is a Class A operator. Traffic: W5MN 209, LGG 2.

NEW MEXICO — SCM, Lawrence R. Walsh, W5SMA — Los Alamos Radio Club's new officers are NJR, pres.; PGY, act. mgr.; MYQ, secy.-treas. New officers of the Sandia Radio Club are ODQ, pres.; NRP, vice-pres.; PTF, secy.; PQW, treas. HSO worked MOX on 28-Mc. ground wave. Ted has 80 countries confirmed on 3.85-Mc. phone. NXE is manager of the 11th Regional Net (3510 kc.). MYA has his kw. with 813s about ready to go. AHB has joined the Navy. MSG, Class 1 OO, averaged 31.5 parts per million error in the last F.M.T. NJR has been appointed OPS. MYQ is an OES. BYX recently was appointed OPS. JYW now is located at Deming. NZV plans to install a small rig in his car for 3.85-Mc. phone mobile work. MUY, MMX, PSP, and PUZ are active from Artesia. The Artesia gang is interested in organizing a slow-speed net (Pecos Valley Net) on 7 Mc. QPF and QPD are new Los Alamos clubs. 3RHU/5 and 5PZT recently joined the Los Alamos Club. 5FAG has a twelve-element beam on 144 Mc. Hub transmits and listens every Monday at 8:00 p.m. until 8:30 with beam pointed north and from 8:30 p.m. to 9:00 p.m. with beam pointed south. Traffic: W5UZO 160, NXE 102, IGO 74, OCK 64, A5ZU 44, W5NRK 39, NJR 31, A5OCK 26.

CANADA

MARITIME DIVISION

MARITIME — SCM, A. M. Crowell, VE1DQ — SEC: FQ, QG, with ZW and WQ, is taking a commercial course at St. Voc. School. QG is using 5 watts on 3.5-Mc. c.w. WG and UJ are on 3.8 and 14 Mc. HW also is on 14-Mc. phone. ES is on 28-Mc. phone and has had some nice work with "hi-fi" phone reproduction. If you hear VE2PX, ex-HK, give him a call. During a recent power shut-off BB, FL, CX, and HB were in QSO, and when the power was cut HB immediately switched over to his emergency self-powered rig and carried on. GC and OE have been quite busy working on their respective homes. FQ spent his vacation working DX and taking a nice motor trip through New Brunswick delivering QSLs to the VE1 boys. Some service — a QSL Manager who delivers 'em personally! TA says he'd like to see a really simple article on single-sideband for 28 Mc. LY has been working plenty of good DX with the new 28-Mc. beam. LZ recently returned from a trip to St. John and we hear he's now the owner of an ART-13 transmitter with all of its fancy wheels and gadgets. FQ and DQ recently had a nice chat via 14 Mc. with VESAJ, ex-1EO. Traffic: VE1MK 28, FQ 8, QG 7.

ONTARIO DIVISION

ONTARIO — SCM, Thomas Hunter, Jr., VE3CP — Asst. SCM c.w. M. J. McMonagle, 3AWJ. Asst. SCM 'phone, E. B. Kimble, 3FQ. SEC: KM, RMs: ATR, AWE, AWJ, BMG, BUR, DU, GI, TM, WK. PAmPs: FQ, DF, RG. BUR again leads in traffic. New appointments include IL as OPS and BUC as ORS. LA now is a member of the A-1 Club. YJ and IL are mobile on 3.85 Mc. A tower-raising bee at AAF's turned out to be a small hamfest. BYF is a member

(Continued on page 100)

BOB HENRY, WØARA, OFFERS YOU:

LOW PRICES: I sell to you as cheap or cheaper than you can buy anywhere.

COMPLETE STOCKS: Collins, Hallicrafters, National, Hammarlund, RME, Millen, Harvey-Wells, Meissner, Gonset, Meck, Johnson, RCA, all other amateur receivers, transmitters, beams, TV, AM-FM, high fidelity amplifiers and speakers, test equipment, tubes, parts, etc. I can supply nearly any equipment shown in any catalog or advertisement and at lowest prices.

BEST TRADE-IN ALLOWANCE: Customers in all parts of the USA trade with me because I allow so much. Tell me what you have to trade and what you want. I also buy equipment.

TIME PAYMENTS: You can order anything on terms. I finance the terms myself to save you time and bother. Customers everywhere in the USA find my terms best. Write for details.

QUICK DELIVERY: Mail, phone, or wire your order. It will be shipped promptly. I can be reached nearly 24 hours a day, 7 days a week.

TEN-DAY TRIAL: Try any communications receiver ten days — if you return it your only cost is shipping charges.

PERSONAL ATTENTION: The Butler store is run by Bob Henry, WØARA, and the Los Angeles store by Ted Henry, W6UOU. We make the deals ourselves. We finance the time payments ourselves. That way we have the lowest overhead and can do more for you. That's why YOU AND I CAN DO BUSINESS. Write, phone, or visit either store.



73,
Bob Henry
WØARA

Butler, Missouri

HENRY RADIO STORES

1124 Olympic Blvd.
LOS ANGELES, 25
CALIF.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

Telex Headsets Keep QSO's Q5

TWINSET*

MONOSET*



Telex Headsets are easy on the ears! No pressure whatsoever, background noise blocked out. They clip sharply at 3000 cps adding another Q5'er to your receiving setup. Mighty relaxin' for hours of traffic, DX, or just plain rag chewing.

The Twinset weighs only 1.6 ounces, the Monoset, 1.3 ounces.

Write for free folder on both headsets today . . . or see your Parts Jobber.

TELEX

Dept. Y-24-1
TELEX PARK
Minneapolis, Minn.

IN CANADA, ATLAS RADIO CORP., TORONTO

STANDARD OF THE WORLD FOR QUALITY HEADSETS

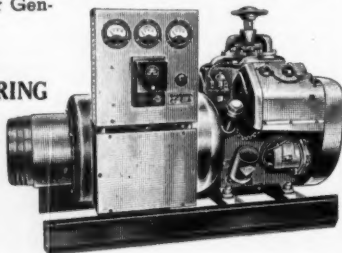
WHAT! NO LIGHTS!

Sizes range from small portable 300 Watts to 300 K.W. Mfgs. of Converters, high frequency Generators, Motor Generator sets.

**KATO
ENGINEERING
COMPANY**

1437 First
Avenue

Mankato
Minnesota



of AFARS for West Toronto. BYB is having trouble with his frequency meter. GN has 1/2-kw. and schedules GG. ZE is working hard on the XTAL. The gang in Toronto, and especially H., really put on a fine display for the Red Cross during the last emergency tests. BOW and AQG worked W9TKL on 144 Mc. KM is trying his luck on 28 Mc. when not on 3.8 and 50 Mc. BNQ works Gs with 10 watts mobile. BPE increased power with p.p. 811s. ALU runs code practice on 7050 kc. daily at 6:45 p.m. API is on from new location with higher power. DEI is a newcomer to Kirkland Lake. KM spoke to the Windsor gang on emergency work. WA has left us for the U.S. The Kirkland Lake gang, under BHU, did a fine job in the last Simulated Emergency Test. DDU (30CP) is new in Camp Borden. VD is one of the few old-timers still reporting. Macmaster University has formed a ham club under AFARS. GG replaces ADR as SC for AFARS. PH is on 50 Mc. BQL has transferred to the Signal Corps. BL is a member of RCC. While operating mobile in Windsor, HI found out why the gang in Windsor gets out so well. Traffic: VE3BUR 238, WY 158, 1A 131, BQL 108, ATR 76, IL 72, NI 68, BL 66, CP 58, WK 52, APS 41, BMG 39, BTQ 32, SM 31, AG 28, RG 28, BUG 23, DF 23, BBM 21, DH 21, GI 20, AQB 19, BSA 17, BVR 16, KM 15, HK 14, FQ 13, YH 13, BER 12, PH 10, YJ 10, VD 6, DDM 5, DD 4, ADN 2.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2GL — CG has completed a summer on board ship and now is located in Montreal looking for a place to hang his sky wire. DD is using supermodulation on 14 Mc. and LP has 813 with supermodulation on 3.5 Mc. Both like it extremely well and report excellent results. KC has schedule with KJHG on 28 Mc. every Saturday and Sunday. AJA, with 6L6 into 807 final with folded dipole and HQ-129X, is new in St. Lambert. He is an ex-G. AAK, of Pt. St. Charles, is new on PQN. GM is on PQN, TRN, and EAN, and handles lot of traffic. XB has changed QTH to Lachine and is now located directly above BB. XR, AEG, and GE are helping with a rig for a blind newcomer ham and DU located a receiver for him and is assisting with code. EC reports the Quebec Phone Net is active with VE, AHK, AHN, RM, AIM, AT, ZG, and ABB. QJ is new president of St. Maurice Valley Amateur Radio Association. AHK has announced the arrival of his first harmonic. ABJ has miniature radio-controlled car, operated on 28 Mc. The Quebec Club sponsored its annual oyster hamfest on Oct. 22nd and as usual a large crowd of hams and friends attended. PQN is away to a fine start and now that Daylight Saving Time is over GM is looking for better representation. Drop in on the net on 3570 kc. at 7 and 10 p.m. nightly and the QEN on the same frequency at 10:30 a.m. Sunday. Traffic: VE2GM 157, XR 123, BB 56, CD 56, EC 50, IG 20, AIE 6.

VANALTA DIVISION

ALBERTA — SCM, Sydney T. Jones, VE6MJ — SEC: MJ, OP is busy on 3.5-Mc. c.w. P.B. is rebuilding. IK sports new homebrew 'scope. NA finally chased the mice out of the SX-25. JJ works out well on 14-Mc. 'phone. QF and KC are combining efforts on a new rig. OD is new PAM for Alberta. NA and MJ are appointed Class III Observers. MA claims he has a sad case of BCL. PV and VJ are busy building new QTH. EO is kept very busy ironing bugs out of the city police f.m. rig. OF works the 14-Mc. band. JJ works out well on 14-Mc. 'phone. MB has been appointed OBS and EC for the Coronation area. TH puts out an FB signal on 3.8-Mc. 'phone. EA is building 50-Mc. exciter. A volunteer is needed for Route Manager appointment. He should be a good c.w. man. If interested, contact your SCM. CE and his XYL are visitors to Red Deer. IY is heard regularly on the Alberta 'phone net. TK and the Calgary gang did a marvelous job in the Simulated Emergency Test Oct. 16th. HQ renewed membership in the ARRL. Pleased to have you with us. Bill. AO received DXCC certificate. How do you do it, George? Traffic: VE6NA 174, MJ 15, NB 3.

BRITISH COLUMBIA — SCM, Ernest Savage, VE7FB — Vancouver ARC held very successful Simulated Emergency Tests, Saturday and Sunday, Oct. 15 and 16. Operating solely from battery power on 3.5-, 14-, and 7-Mc. 'phone and c.w., MC received a small citation from the R.C. for no carrier shift indicator. DB has ten watts 'phone and is waiting for the money to pile up to buy new modulation transformer. Capt. AEY is on 14- and 28-Mc. 'phone and is shaping up a nice beam for 14 Mc. ADZ has a new jr. operator. While his wife was in the hospital he scored ten new countries on 28 Mc. AHQ at last made WAC in only four years on 28 Mc. AL made WAC in one month with no transmitter on and all were on 14-Mc. c.w. Somebody didn't get any QSLs. AIE is DXing on 3.5-Mc. c.w. ADQ has moved to a new QTH and the power company moved its 60,000 volts across the front of his new place just to annoy him. ALJ is all set now with VFO and 28-Mc. beam and cold nights vs DX. CN broke his leg and tells us he was reaching into the truck and not for what we think. He even tried to convince the doctor, XU, who set the leg. ARG is back in Sherman after being 28-Mc. mobile in VE6 LAND for two years. Traffic: VE7FB 131, BJ 82, AC 6, FB 4.

(Continued on page 108)



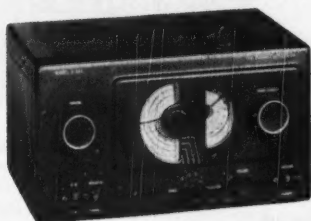
GET ON THE AIR FOR LESS THAN \$80 With this Complete ALLIED Ham Station!

Now—at no more than the cost of the receiver and transmitter alone—you can own a complete station setup! Here's what you get: Hallicrafters S-38A all-wave receiver (4 continuous bands, 540 kc to 32 mc); Hallicrafters HT-17 transmitter complete with coils for 80, 40, 20, 15 and 10 meters; good quality handkey; 2000 ohm double headset; 80-meter crystal; 2 antenna insulators; 200 ft. coil antenna wire; ARRL station logbook; Amateur Radio Callbook. This equipment—and your Amateur License—is all you need to start your two-way radio contacts! It's complete for less than \$80!

97-636. Complete ALLIED Amateur Station.

SPECIAL AT ONLY.....\$79⁹⁵

Terms: \$7.95 down, \$6.32 monthly for 12 months



hallicrafters S-38A All-Wave Receiver

The big all-wave value that amazes even the experts. Covers 4 full wave bands, continuous range from 540 kc to 32 mc. Features: full electrical bandspread; Band Selector; Voice-Code switch; Speaker-headphones switch; Standby-receive switch; latest PM speaker. In handsome furniture-steel cabinet, 12 x 7 x 8". Complete with all tubes. For 105-125 volts, 25-60 cycles AC, or 105-125 volts DC. Shpg. wt., 14 lbs.

97-508. Model S-38A Receiver. Only.....**\$39⁹⁵**



hallicrafters HT-17 Transmitter

Ideal CW rig for beginners. 10 watts output on 80, 40, 20, 10 meters. Uses 6V6GT crystal oscillator driving an 807 final. Controls: Plate Tuning, Antenna Loading, Standby, Meter Switch, Power on-off. Rear terminals for antenna, ground, key, external modulator. Satin-black metal cabinet, 12 1/4 x 6 1/2 x 7 1/4". For 105-125 v., 50-60 c. AC. Complete with tubes and all coils. Less crystal. Shpg. wt., 25 lbs.

97-580. HT-17 Transmitter. Only.....**\$39⁵⁰**



Send for the Leading Amateur Buying Guide

You'll find everything you want in receivers, transmitters, instruments, parts and station equipment in this 196 page Catalog. Get it today. And get every buying advantage at ALLIED—fast shipment, money-saving values, top-quality equipment, ideal easy-payment terms, square trade-in deals and real help from ALLIED'S Hams. Get and use the ALLIED Catalog!

ALLIED RADIO

Everything for the Ham

ALLIED RADIO CORP., D. L. Warner, W9IBC
833 W. Jackson Blvd., Chicago 7, Ill., Dept. 15-A-0

☐ Send FREE ALLIED Catalog

☐ Enter order for

Enclosed \$.....

☐ Full Payment

☐ Part Payment (Bal. C.O.D.)

Name.....

Address.....

City..... Zone..... State.....

FREE



RADAR, COMMUNICATIONS and SONAR TECHNICIANS WANTED

For Overseas Assignments

Technical Qualifications:

1. At least 3 years' practical experience in installation and maintenance.
2. Navy veterans ETM 1/c or higher.
3. Army veterans TECH/SGT or higher.

Personal Qualifications:

1. Age, over 22—must pass physical examination.
2. Ability to assume responsibility.
3. Must stand thorough character investigation.
4. Willing to go overseas for 1 year.

Base pay, bonus, living allowance, vacation add up to \$7,000.00 per year. Permanent connection with company possible.

Apply by Writing to
C-3, P.O. Box 3552
Philadelphia 22, Pa.

Men qualified in RADAR, COMMUNICATIONS or SONAR give complete history. Interview will be arranged for successful applicants.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way—with an **Instructograph Code Teacher**. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The **Instructograph Code Teacher** literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the **Instructograph System**. Write today for full particulars and convenient rental plans.



INSTRUCTOGRAPH COMPANY

4789 SHERIDAN ROAD, CHICAGO 46, ILLINOIS

PRAIRIE DIVISION

MANITOBA—SCM, A. W. Morley, VE4AM—The Manitoba 'phone net is going great guns on 3805 kc. with 18 stations reporting in. DQ, who is the farthest north station in the section, is the newest member. WF is in new QTH at The Pas. AR was in Winnipeg and is winding coils for 28 Mc. LF paid him a return visit. IF renewed his OBS appointment and DN has his OPS appointment. DJ is on 3.8 Mc. from Shilo. AE has new compact job on 28 Mc. Ex-DP, now in VE7 Land, is celebrating the addition of a jr. operator. LC, the QSL Manager, reports again that there are hundreds of cards in the Bureau. I want to thank the fellow using my call for a WAC. Bostlegging has reached a new high in this section. LC, RP, and AM have all been used. DF has changed his preamplifier on the 28-Mc. 'phone job. EH is playing with motor-boats. AD has the 3.8-Mc. bug. JE is running a schedule with his son in Vancouver. Congrats to QG on the addition of a jr. operator. DO has new n.f.m. job on 14 Mc. FA is heard on 3.8 Mc. 3AFH was in Winnipeg. JM has n.f.m. rig on 28 Mc. Once again it's my pleasure to wish you all the best of Season's Greetings. Let's hear from you this year. Traffic: VE4AM 40.

SASKATCHEWAN—SCM, J. H. Goodridge, VE5DW—J works Southern U. S. A. on 160 meters. BH has ORS appointment and is alternate on TLI. HR reports TLI is doing fair for a start despite Aurora, and that he had a fair score in the CD Party. CE and OM checked over their 28-Mc. beams ready for winter operation. WK, ex-IRM, 4VG, is a new call in Regina on 14-Mc. c.w. The University Club has doubled its membership since last year and is working on additional equipment. QZ, now at Dafoe, visited Saskatoon. EE, JF, CJ, and NG attempt Sunday morning schedule on 50 Mc. UQ has 16 watts to 12-foot whip. CM worked Wls on 440 Mc. during Aurora activity. AW sold his receiver for carpentry tools. MA has consistent 3.8-Mc. signal with supermodulation. At recent club meetings officers were elected as follows: Regina: WL, pres.; LJ, vice-pres.; JW, secy.-treas. Saskatoon: DR, pres.; GR, vice-pres.; OB, secy.-treas. University Club: MV, pres.; Jack Jannon, secy.-treas. Prince Albert: PA, pres.; CB, 1st vice-pres.; VB, 2nd vice-pres.; Bob Paul, secy.-treas. Club meetings are held each month, at Regina the 1st Monday, at Prince Albert the 1st Wednesday, at Saskatoon the 2nd Friday. Traffic: VE5HR 30, BH 12.

Strays

The Evaluation Committee of the American Library Association recently picked *QST* as one of 97 magazines meriting honorable mention in a competition in which 5917 publications were considered. *QST* was described as a "veritable textbook, containing a wealth of data" and was further complimented by the statement that "*QST* contains the most accurate, concise and dependable material in its field and enjoys a well-earned reputation." This is the second time *QST* has been so honored in the Association's survey.

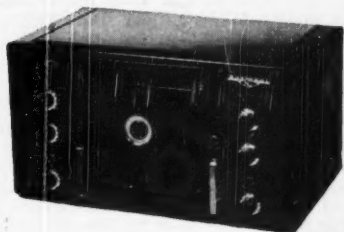
The *Radioclub Hispanoamericano* has been organized in New York City to foster the study and use of the Spanish language by amateurs in English-speaking and other non-Spanish countries. Member stations use the special calls "CQ Spanish-American Friendship" or "CQ *Amistad Hispanoamericana*," meaning welcome to any station wishing to learn Spanish. The club's services include a free Spanish-English and English-Spanish dictionary of terminology generally used in 'phone QSOs with amateurs in Spain and Latin-American countries. Membership is open to any genuinely interested amateur. Address all inquiries to *Radioclub Hispanoamericano*, c/o W2TWR, 63 West 102nd Street, New York 25, N. Y., U. S. A.

Recommended reading: *Coronet* for October, 1949, contains a heart-warming article on ham radio entitled "Nobody Has To Be Lonely." Will Oursler is the author.



Gigantic January USED EQUIPMENT ROUND-UP

Yippee and yessiree! The wild and wooly west hasn't seen anything *half* as wild as the way we're trading our brand new **NATIONAL RECEIVERS** for your used Communication equipment. In the gosh darndest trade-in offer ever attempted, Walter Ashe is fixin' to corral every old, unwanted (factory-built) unit in the land! So round up the "doggies"! Tell us what you have to trade. We'll come right back with a "Surprise" allowance that's bound to knock the Stetson off your head. Don't delay, pardner. Wire, write, phone or use the handy coupon.



Amazing new **National HRO-50**. Only... **\$349⁰⁰**
Shpg. wt. 80 lbs.
Less trade-in value of your used equipment



NC-57

Sensational! **National NC-57**. Only... **\$89⁵⁰**
Shpg. wt. 34 lbs.
Less our special, "Surprise" allowance.

Walter Ashe
RADIO CO.
1125 PINE ST. • ST. LOUIS 1, MO.

Terrific Bargains in
**national
RECEIVERS**

made possible by

Surprise **TRADE-IN**

ALLOWANCES on your

USED

COMMUNICATION

EQUIPMENT

EASY TERMS ON YOUR

NEW EQUIPMENT

PURCHASES

**FREE
NEW
1950
CATALOG**

Phone: **CHEstnut 1125**

All prices F. O. B. St. Louis, Missouri

Latest National Radio Products Catalog Free on request.

Walter Ashe Radio Co.		Q-50-1
1125 Pine St., St. Louis 1, Missouri		
<input type="checkbox"/> Rush Special "Surprise" Trade-in offer on my.....		
(show make and model # of used communication equipment)		
for NATIONAL Receiver (indicate make and model #)		
<input type="checkbox"/> Mail my Free copy of new 160 page Walter Ashe Catalog		
<input type="checkbox"/> Send Free copy of National Radio Products Catalog		
Name.....		
Address.....		
City.....	Zone.....	State.....

Hams everywhere are back on the air
with the

Drake Low Pass Transmitter Filter

TV-52-40LP for 52-ohm Coax
TV-300LP for 300-ohm
Twin Lead

Either **\$12.95** Amateur,
Model Net



Paul Stumpf, W3AQN, York, Pa., says:

"Before I installed the TV-52, Channel 2 would black out on all TV sets. Now I can operate 10 meters any time I want. It helps the other channels, too."

The Drake Low Pass Filter is an M-derived double section filter with output and input circuits shielded. Installed in the transmission line of your transmitter, 30 MC and lower, the filter attenuates all antenna and feed system harmonic radiation above 40 MC with no reduction in signal strength at your fundamental frequency. Handles 1 KW on reasonably flat lines. No adjustment required. Once installed it is forgotten and you can QSY and move from band to band at will.

Tell your neighbors about the



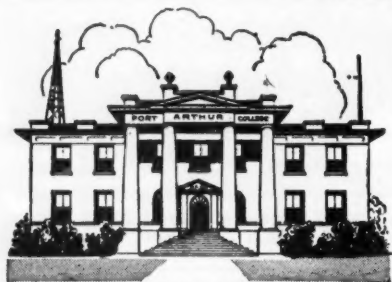
Drake High Pass Filter

Installed in the antenna input to a TV receiver this filter suppresses interference (50 mc and lower), from amateur transmitters and many other sources, entering the set thru the antenna system. Two types available—TV-300 for 300-ohm Twin Lead and TV-72 for small 72-ohm coax. Either type — **\$5.95** list

All Drake filters are completely factory assembled and laboratory adjusted for maximum attenuation.

See Drake Filters
at your distributor
or write us for de-
tails. ☐ ☐ ☐

The R. L. Drake Co.
11 Longworth St. Dayton 2, Ohio.



Founded in 1909

RADIO TELEPHONY RADIO TELEGRAPHY

Courses ranging in length from 7 to 12 months. Dormitory room and board on campus for \$40.00 a month. The college owns KPAC, 5 KW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training necessary to pass F.C.C. examinations for first-class telephone and second-class telegraph licenses, write for details.

PORT ARTHUR COLLEGE PORT ARTHUR
TEXAS

Approved for G. I. training

Filter for Harmonic Suppression

(Continued from page 14)

is greater than 1250 watts, amplitude-modulated. Insertion of the filter does not upset the standing-wave ratio in a moderately flat line. If the s.w.r. is greater than 2 to 1, the power-handling capability is reduced correspondingly.

Cost

The total cost of the filter should be less than \$10.00. The copper enclosure and capacitor plates shown in the photograph were made by a commercial sheet metal shop for \$6.00, although some estimates ran as high as \$18.00. However, the box may be easily fabricated by anyone with a moderately heavy-duty soldering iron or torch. At the present time Teflon costs \$10.00 per pound and is sold in minimum quantities of one pound, but it is hoped that before long some manufacturer or supply house will stock the material so that amateurs can buy the small quantities needed in filters of this type.⁴

Acknowledgments

Without extremely helpful assistance the development of this filter would have been considerably more difficult and time consuming. George Caffrey, W3JOQ, and Bill Rubin, W3MQU, checked the filter computations and assisted with the construction, in addition to running laboratory performance checks. Both spent many man-hours, with George making all the photographs and Bill many different inductors. To them, the writer extends his most sincere thanks and appreciation.

⁴ The author has agreed to supply the Teflon precut to size, including sufficient material for the disks, until such time as it is in distribution through regular channels. Address P. O. Box 11, Ivyland, Penna. — Ed.

Polarization on 144 Mc.

(Continued from page 16)

favor of horizontal. Even cross polarization, with the W1HDQ array horizontal, was better than vertical-to-vertical. These observations over short but nonvisual paths are in line with results of similar tests made in the early days of 2-meter operation.²

Commercial tests have purported to show that vertical is superior to horizontal over sea water, but W1PIV and the writer have not found it so. W1PIV has made numerous tests with W4IKZ and others over a 450-mile hop that is salt water almost every mile of the way. Horizontal has been consistently better, though not by a tremendous margin. The writer has made tests with W4IKZ on four different evenings, with three of them showing about one S-unit advantage for horizontal. The fourth? Exactly the same for both, in several checks made in the course of an hour or so of steady but weak signals. This was the same evening that our high-low antenna tests worked out in reverse.

(Continued on page 106)

² "Need There Be Line of Sight?" QST, March, 1946.

NEW RECEIVERS IN STOCK!

NATIONAL	
HRO-50 complete	\$349.00
NC-33 complete	57.50
NC-46 less spkr	9.90
NC-46TS spkr	89.50
NC-57	89.50
NC-57 Marine	189.50
NC-173T less spkr	10.00
NC-173TS speaker	268.00
NC-183T less spkr	14.00
NC-183TS speaker	99.50
NC-108T complete	142.00
HFS less pwr sup.	22.43
5886 power supply	

HALLICRAFTERS

S-38A complete	\$ 39.95
S-40A complete	79.95
S-51 complete	149.50
S-52 complete	79.95
S-53 complete	69.95
S-72 complete	79.95
SX-42 less spkr	275.00
Sprkr for SX-42	34.50
SX-43 less spkr	159.50
Sprkr for SX-43	24.50
SX-62 less spkr	269.50
Sprkr for SX-62	34.50
SX-71 less spkr	179.50
Sprkr for SX-71	24.50

TRIPLITT Pocket-Size VOLT-OHM-MIL-AMMETER

666-R - Single range selector switch and flush enclosed molded unit construction. AC and DC ranges: 0-10/50/250/1000/5000 ohms per volt. DC current ranges: 0-10/100/1000 milliamperes at 250 millivolts. Resistance: 0.3K/300K/3 Megohms. With batteries and all-purpose 50-inch test leads. Shpg. 24c

2401

HARVEY-WELLS BANDMASTER TRANSMITTERS

Small in size, packed with power and efficiency! 40 to 50 watts on all amateur bands from 3.5 to 148 Mc. Built-in coils for easy band switching. Has antenna coupler, crystal oscillator - VFO switching, provision for control, 100% break-in operation, driving higher powered rigs. In attractive steel cabinet: 13 1/4" high x 9 1/2" wide x 8 1/2" deep. Complete with tubes, less power supply and crystals. Add \$11.00 each for shipping.

TBS-50B CW only, but modulator can be added	\$ 87.50
TBS-50C Phone and CW, uses carbon microphone	111.50
TBS-50D Phone and CW, uses crystal or high impedance dynamic microphone	137.50
APS-50 Power supply for 110 V.A.C.	39.50
VPS-50 Power supply for 6 V.D.C.	29.75

RAYTHEON VOLTAGE STABILIZERS

Raytheon voltage regulators are entirely automatic, will hold fluctuating input of 95 to 130 volts, 60 cycles A.C. to a constant output of 115 volts, plus or minus 1/2%.

Model	Watts	Shpg.	Net
VR-6110	15	.30	\$ 15.00
VR-6111	30	.34	17.00
VR-6112	60	.48	24.00
VR-6113	120	.62	31.00
VR-6114	250	.96	48.00
VR-6115	500	1.50	75.00
VR-6116	1000	2.50	125.00

COMPLETE STOCKS

At Terminal you will always find a complete, up-to-the-minute selection of everything in radio.

HELPFUL SALESMEN

Terminal salesmen are trained and experienced radiomen; most of them are active "hams". They know your problems and their answers.

LOWEST PRICES

Great savings are reflected in many instances by Terminal's tremendous purchasing power. You always save time and money at Terminal.

PROMPT DELIVERIES

Complete messenger and trucking facilities aid our shipping department in dispatching orders efficiently and speedily.

TERMINAL

RADIO CORPORATION

HAMMARLUND HQ-129X complete

18915

ECO 400K 5-Inch OSCILLOSCOPE KIT

Think the low price is amazing? Wait till you see its terrific performance! Preferred by leading radio schools. Easy to assemble, supplied complete with all parts, tubes, giant power transformer, controls. Tubes supplied are 2-5Y3, 2-6SJ7, 864, 58P1 cathode ray. Shpg. wt. 30 lbs.

3995

TELEX HEADSETS

2568 - Popular high fidelity Monoset, as illustrated. Weighs only 1.2 oz. Eliminates ear pressure fatigue. Removable sanitary plastic ear tips, 5 ft. cord and phone plug. Specify 2000 or 128 ohms. Shpg. 11c.

7.29

3725 - New Twinset, weighs only 1.6 oz. Matched pair midge phones, comfortable and convenient to wear. Complete with 5 ft. cord, phone plug. 1000 or 64 ohms. Shpg. 13c.

8.82

MILLEN GRID-DIP METER

90631 - Compact and completely self contained, measures only 3 1/8" x 3 1/2" x 7". AC power supply, has provision for battery operation, lengths on anti-backlash gear-driven drum dial. Ideal for amateur and engineers. Complete with tubes and inductors.

5500

SPECIAL 866 Filament TRANSFORMER

Fully shielded and designed for continuous heavy duty. 2 1/2 volts center-tapped secondary @ 10 amperes. 10,000 volts insulation. 115 volts 50/60 cycles primary. Shpg. 45c.

295

THE JOHNSON VIKING I TRANSMITTER KIT

A 100 watt phone and CW transmitter, with finest commercial efficiency and appearance! Supplied with wiring harness for easy output stage assembly. Pi-network. Bandwidth matches any antenna for 160, 80, 40, 20, 15, 11 and 10 meters. Tubes required: AD32, 6AQ5, three 6AU6, two 807, 5Y3, two 58AGY, 6AL5. Complete with all parts, hardware, punched chassis, handsome cabinet and instructions. Less tubes, crystals, key and mike.

20950

WELLER "SOLDERITE" Soldering Guns

Just squeeze the trigger switch for fast and better soldering! Built-in spotlight. Operates on 115 volts, 60 cycles AC. Shpg. each 30c.

S-107 Single heat, 100W	\$11.71
WS-200 Single heat, 200W	12.49
D-207 Dual heat, 100/135W	13.67
WD-250 Dual heat, 200/250W	14.65

OHMITE "Little Devil"

RESISTOR ASSORTMENT

These handy plastic cabinets contain 125 resistors in the most often-used values. You pay only for the resistors - the handsome, valuable cabinet is free! Shpg. 45c.

CAB-1-1/2W selected ass't. \$12.25

CAB-2-1W selected ass't. 18.37

The G.E. "HARMONIKER" TVI KITS!

- Suppress TVI radiation! Terminal has complete parts kits for the G.E. "Harmoniker".
 - Supplied with coils, condensers, shielded container, ceramic stand-offs, binding posts and instructions.
 - All condensers rated 1000 volts DCW 2% accuracy.
- | | |
|-------------------------------|-------------|
| BAND 100 Ohm Kit | 300 Ohm Kit |
| 10 Meters | \$3.79 |
| 20 Meters | \$4.29 |
| 40 Meters | \$4.99 |
| 80 Meters | \$5.99 |
| Add 30c each kit for shipping | \$7.27 |

MAIL ORDERS - If unable to visit our store, send us your mail orders. Please remit in full all orders under \$5.00. 25% deposit for COD's. Prices are FOB New York.

TERMINAL

RADIO CORPORATION

Distributors of Radio & Electronic Equipment
85 CORTLANDT STREET
NEW YORK 7, N. Y. - Phone: WOrth 4-3311

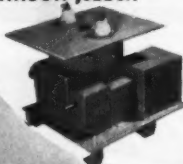


GUARANTEE - Every item, regardless of its low price, is fully guaranteed by TERMINAL.

A Superior Rotator

Illustrated is the husky **JOHNSON RotoMatic** rotator, ideal for chasing DX. Heavy steel gears, truly weatherproof construction and positive lubrication make it a dependable all weather performer.

Write for catalog 704 describing all RotoMatic components or see your **JOHNSON** jobber.



Features

- Continuous rotation
- Noiseless slip rings
- Instantly reversible motor
- Tilt base
- Selsyn direction indication
- 1200 to 1 gear reduction
- Positive locking
- Speed 1½ RPM
- Safely handles 2½ KW
- Lifetime "oilite" bearings



E. F. JOHNSON CO.
WASECA, MINNESOTA

MM-2 MODULATION MONITOR



3" x 5" x 10"

AN IDEAL CHRISTMAS GIFT

This basic oscilloscope featuring calibrated modulation percentage scale, linear 60 cy sweep with return trace blanking, trace intensifier window, complete controls, reversible panel, rack mounting provisions and many other outstanding features. See the MM-2 at your dealer or write Dept. 1-9

NOW—ALSO AVAILABLE IN COMPLETE KIT FORM

FOR ONLY \$14.95

Send for Descriptive Literature



LAMBDA ELECTRONICS CORP.

BOX No. 55

CORONA, N.Y.

Horizontal had the edge in several checks with W2WFB, but Walt's flop-over system obviously gave horizontal the benefit of the doubt, since it was stacked four high in that position. The tests with the South Jersey W2s were inconclusive, if one considers only the S-meter readings. The signals did seem to have the edge in readability on horizontal, however.

And how about the best DX of all, the rugged and "impossible" path over the Alleghenies to W8UKS? This one, though hardly conclusive, in view of the excitement attending the opening and the briefness of the test (we didn't want to be blackballed forever by W1s and W2s who were waiting for their first crack at Ohio!), stands out as a refutation of the claim that only horizontal can make the grade when the going is roughest. With signals just barely readable on our high horizontal, we switched to the low vertical when Sam changed, and there he was, still workable. W1-W8 can be worked with vertical polarization, and don't let anyone tell you different. No flop-over comparison was made, as we wanted to free W8UKS as rapidly as possible.

The same has been true of every comparison we've yet made. No matter how weak the signals were on one polarization, they've always come through on the other. The longer we work with the flop-over array the more we become convinced that the tremendous advantages claimed by some workers for horizontal are based largely on fallacious reasoning and inconclusive tests. It is interesting to note that where small arrays are used the margin between horizontal and vertical is most marked. This is as might be expected, if we stop to think of the effect of adding parasitic elements to a single driven element. Where two stations use large arrays that can be expected to radiate uniformly in both planes, the margin is very small, indeed, and this appears to result mainly from the generally-better signal-to-noise ratio when horizontal arrays are used, rather than from any difference in propagation qualities.

To say, as some have, that all of the real DX has been worked with horizontal is to ignore the facts. All our v.h.f. records, up to the summer of 1947, were made with vertical antennas, and the full extent of activity (500 to 650 miles) along the Atlantic Seaboard has been covered again and again with vertical systems. Recent extensions of the record to 660, 800, and now 850 miles, were more the result of good locations, snappy operating, improved equipment and favorable conditions, than of antenna polarization.

This is not to argue against horizontal, but merely to plead for open-mindedness in considering the polarization question. Our own experience, covering a period of more than fifteen years, on 56, 50, 112, 144, 224, 220, and 420 Mc., indicates that if ability to work consistently over longer distances were our principal consideration we would do somewhat better by standardizing on horizontal antenna systems for all v.h.f. work. We doubt, however, that we shall soon see that standard adopted, for reasons that are beyond the scope of this discussion.

SAVE \$ ON SUN SURPLUS AND STANDARD SPECIALS!

HI-FIDELITY MUSIC LOVERS

Now in stock for immediate delivery all the components necessary to assemble the hi-quality-lo-cost radio phono combination as recommended by a well known consumer research organization.

MEISSNER 8C FM tuner with cabinet...	\$38.33
MEISSNER 8C FM tuner less cabinet...	34.33
GENERAL ELEC-TRIC 1201 D. Speaker	17.70
UNIVERSITY 4401 Single Tweeter...	12.00
UNIVERSITY 4402 Dual Tweeter...	24.00
UNIVERSITY 4405 Filter Network...	6.00
BELL 2122 Amplifier...	41.50
BOGEN PH-10 Amplifier...	29.25
G.E. Preamp, self powered...	9.57
WEBSTER 356-27 Record Changer with G.E. Cartridges...	39.75

We will do all the necessary adaptation so that all you have to do is plug in and play after installation in your own cabinet. There is no charge for adaptation, except for extra wire, plugs, etc., which amounts to very little. When ordering please include sketch of layout and length of wire needed on each item. Allow one week for adaptation.

PICKERING MAGNETIC PHONO CARTRIDGES FOR THE ULTIMATE IN HI-FIDELITY RECORD REPRODUCTION

S-170 M. Sapphire, Standard Play...	\$9.90
S-140 S. Sapphire, Long Play...	15.00
D-120 M. Diamond, Standard Play...	24.90
D-140 S. Diamond, Long Play...	36.00
R-150 Replaceable Stylus Cartridge less stylus...	9.90
Standard Play Stylus for R-150...	2.40

PRESTO — 15G 3-Speed 12" balanced turntable and motor. Professional quality for home use... \$38.00

REK-O-KUT — LP-743, 3-Speed 12" Balanced Turntable and Motor... \$49.50

PARTS ASSORTMENTS

100 Ass't Elec. and Tubular Cond.	\$3.49
100 Ass't Resistors...	1.00
100 Ass't Mica Cond., unmarked...	1.00
25 Ass't Pots...	4.95
100 Octal Wafer Sockets...	2.95
100 Octal Bakelite Sockets...	3.95

PHONO ARMS

American model No. 1-j with CR 1a 3.5 volt output cartridge. Unboxed. New... \$1.65

Atactic SL 8 and D 9 with L-26a cartridge. Standard replacement unit. Boxed. New... \$1.89

Phono arms less cartridge, but with all necessary hardware, straight or curved. Five (5) for... \$1.95

HAMS

Sun Radio now has for immediate delivery full stocks of all popular ham parts and equipment such as — NATIONAL HAMMARLUND, HALICRAFTERS, RME, BUD, MEISSNER, BARKER AND WILLIAMSON, HARVEY-WELLS and many others. Write us your requirements and problems. W3PPQ and W3MQD AT YOUR SERVICE.

FAMOUS MAKE BUTTERFLY TRANSMITTING CONDENSERS SPLIT STATOR

All New—Boxed—Below Cost

500 spacing Cap.	375 spacing Cap.	250 spacing Cap.
per. sec. Price	per. sec. Price	per. sec. Price
11 MMF \$8.35	11 MMF \$8.15	13 MMF \$7.95
30 11.35	22 9.95	30 9.80
68 17.80	34 11.30	45 11.20
87 20.65	58 14.35	95 15.40
96 22.15	70 15.90	111 16.80
185 23.80	82 17.20	159 21.00
115 25.20	94 18.75	
124 26.65	106 20.15	
	118 21.60	
	130 23.10	
	141 24.50	
	153 25.95	

VARIABLE CONDENSERS

— as used in SCR-522 — brand new.
2-gang, 220 MMF per section... \$1.29

3-gang, 220 MMF per section... \$1.59

VARIABLE CONDENSER, 1-gang, capacity 14-600 MMF... \$.59

TRANSFORMERS

Ham Transformers — Peerless (Altec Lansing) new, not surplus, priced below cost.

Modulation Trans. — 20 w. Universal No. M-4081Q. List \$9.25. Only... \$3.70

Modulation Trans. — 300 w. Universal No. M-2107T. List \$70.00. Only... \$28.00

Plate Trans. — 2428 v. CT-300 MA No. P-5190A. List \$45.00. Only \$18.00

FL. Trans. — 2.5 v. CT-20 Amp. 4500 v. ins. No. R-8513J. List \$8.00. Only... \$3.20

Driver Trans. — Universal, 70 MA for 15 v. Audio No. A423Q. List \$10.75. Only... \$4.30

Grid Mod. Trans. — Kenyon... \$9c

MICROPHONES

Low impedance dynamic for ham or professional use at 60% off list price, brand new American Microphone Co.

Model Impedance List Reduced to

DVT 200 ohm	\$27.00	\$10.80
VR2T 200 ohm	42.15	16.86
D9AT 200 ohm	45.00	18.00
D220T 200 ohm	71.00	28.40

METERS

WESTON 2" r. 500 micro-amp. with scale for 0-15/600v... \$2.97

TRIPLET, 2" sq. 0-40 v. DC meter... 2.97

SUN 2" r. 0-300 v. DC meter... 2.97

SIMPSON 2" r. 0-15 v. DC meter... 2.97

FOUNDATION Meter for 1-177 Mutual Conductance Tube Tester, calibrated in Microhms, with diagram... 3.49

WESTON, 2" range ohmmeter, new with case, 1-10/1000 ohms... 14.97

45 AND 78 RPM ADAPTER for 78 RPM record changers and manual players, converts any 78 RPM record player to a 3-speed player. Quickly attached and removed, just slip on spindle. Only... \$13.50

RECORDING MOTOR AND TURNABLE. Professional 3 1/2" and 78 RPM with 16" aluminum alloy casting table, famous make. Reg. price \$165.45. Brand new; reduced to... \$116.00

GONSET, 6 meter converter, easily converted to 10 meters or use as is on 6. Reg. \$19.95; reduced to... \$27.95

POTENTIOMETERS. 20 assorted singles, duals, pads, etc. Some with switch... \$3.95

DUAL SPEED RECORD PLAYER, 78 and 3 1/2 RPM. AC or DC in Portable leatherette carrying case with 8" speaker and 3-tube amplifier. Heavy 12" table, adjustable speed motor, slightly used but reconditioned and guaranteed... \$12.50

CRYSTALS!

All crystals have Army MC harmonic ratings but Sun encloses directions for deriving the correct fundamental frequency in kilocycles.

JUST ARRIVED! NEW FREQUENCY CRYSTALS FOR HAM AND GENERAL USE — FT-243 Holders, 1/2" pin spacing (Fractions Omitted)

GENERAL USE	HAM USE
6006 6208 7873	2, 6, 10, 11, 20, 40 METERS
6025 6773 7906	5305 5775 5948 6473 6740 7540
6040 6840 7925	5675 5886 5973 6475 6808 7573
6073 6873 7950	5677 5825 5973 6506 7366 7666
6075 6906 7973	5700 5848 6273 6540 7340 7640
6100 6940 7975	5706 5850 6340 6573 7373 7673
6106 6973 8240	5725 5873 6373 6606 7606 7706
6140 7740 8273	5740 5875 6406 6640 7640 7740
6150 7773 8306	5750 5900 6425 6673 7473 8175
6173 7806	5760 5906 6448 6706 7506 8340
6206 7840	5773 5925 6450

49c each

10 for \$4.50

99c each 10 for \$9.00

CRYSTALS WITH A MILLION USES

Fractions Omitted											
kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc	kc
412	422	433	442	462	481	492	503	507	511	516	522
413	423	434	443	463	483	493	504	508	512	518	523
414	424	435	444	464	484	494	506	509	515	519	
415	425	436	445	465	485	495					
416	426	437	446	466	486	496					
418	427	438	447	467	487	497					
419	428	448	448	467	488	498					
420	431	441	451	479	491	502					

49c each

Xtal. Freq. Sten. 3-prong holder 98.356Kc

Easily altered for 100kc Standard. Mounted in low loss 3 prong holder.

\$3.89 each

For Crystal Controlled Signal Generators Ft. 241-325Kc

526,388	533,333	537,500
527,777	536,111	538,888
529,166		
530,555		
531,944		

99c each

I.F. Frequency Standards

450	450	99c
451	451	
452	452	
453	453	
454	454	
455	455	
456	456	
457	457	
458	458	
459	459	
460	460	
461	461	
462	462	
463	463	
464	464	
465	465	
466	466	
467	467	
468	468	
469	469	
470	470	
471	471	
472	472	
473	473	
474	474	
475	475	
476	476	
477	477	
478	478	
479	479	
480	480	
481	481	
482	482	
483	483	
484	484	
485	485	
486	486	
487	487	
488	488	
489	489	
490	490	
491	491	
492	492	
493	493	
494	494	
495	495	
496	496	
497	497	
498	498	
499	499	
500	500	
501	501	
502	502	
503	503	
504	504	
505	505	
506	506	
507	507	
508	508	
509	509	
510	510	
511	511	
512	512	
513	513	
514	514	
515	515	
516	516	
517	517	
518	518	
519	519	
520	520	
521	521	
522	522	
523	523	
524	524	
525	525	
526	526	
527	527	
528	528	
529	529	
530	530	
531	531	
532	532	
533	533	
534	534	
535	535	
536	536	
537	537	
538	538	
539	539	
540	540	
541	541	
542	542	
543	543	
544	544	
545	545	
546	546	
547	547	
548	548	
549	549	
550	550	
551	551	
552	552	
553	553	
554	554	
555	555	
556	556	
557	557	
558	558	
559	559	
560	560	
561	561	
562	562	
563	563	
564	564	
565	565	
566	566	
567	567	
568	568	
569	569	
570	570	
571	571	
572	572	
573	573	
574	574	
575	575	
576	576	
577	577	
578	578	
579	579	
580	580	
581	581	
582	582	
583	583	
584	584	
585	585	
586	586	
587	587	
588	588	
589	589	
590	590	
591	591	
592	592	
593	593	
594	594	
595	595	
596	596	
597	597	
598	598	
599	599	
600	600	
601	601	
602	602	
603	603	
604	604	
605	605	
606	606	
607	607	
608	608	
609	609	
610	610	
611	611	
612	612	
613	613	
614	614	
615	615	
616	616	
617	617	
618	618	
619	619	
620	620	
621	621	
622	622	
623	623	
624	624	
625	625	
626	626	
627	627	
628	628	
629	629	
630	630	
631	631	
632	632	
633	633	
634	634	
635	635	
636	636	
637	637	
638	638	
639	639	
640	640	
641	641	
642	642	
643	643	
644	644	
645	645	
646	646	
647	647	
648	648	
649	649	
650	650	
651	651	
652	652	
653	653	
654	654	
655	655	
656	656	
657	657	
658	658	
659	659	
660	660	
661	661	
662	662	
663	663	
664	664	
665	665	
666	666	
667	667	
668	668	
669	669	
670	670	
671	671	
672	672	
673	673	
674	674	
675	675	
676	676	
677	677	
678	678	
679	679	
680	680	
681	681	
682	682	
683	683	
684	684	
685	685	
686	686	
687	687	
688	688	
689	689	
690	690	
691	691	
692	692	
693	693	
694	694	
695	695	

Have you tried... the Drake Low Pass Filter?

Read what one ham
says:

"Before installing the TV-52 my 400 watt 10-meter smur distorted both the audio and picture on channel 4 of a TV set 50 feet away. Now there is no interference."

Ralph Atkinson, W0WMO
Kansas City, Kans.



If your transmitter is shielded and you have filtered the AC line, it is a safe bet the Drake Low Pass Filter will eliminate your TVI.

Installed in your transmission line the filter attenuates antenna and feed system harmonic radiation above 40 MC, with no reduction of your fundamental when operating in the ham bands, 10 to 160 meters. Handles 1 KW. Two models available.

TV-52-40LP for 52-Ohm Coax
TV-300LP for 300-Ohm Twin Lead

Either Model \$12.95 Add 25¢
Amateur Net for postage

For more information write for Drake Amateur Bulletin

Have you told your neighbors about the Drake High Pass Filter?

Installed in the input to the TV receiver or booster the Drake High Pass Filter rejects diathermy amateur and SW broadcast, QRN and other noise below 50 MC. Protects the I.F. channel and video amplifier. To help sell them to your neighbors (List Price \$5.95) write for folder "The Need for a High Pass Filter"

TV-300-50HP for 300-Ohm Twin Lead
TV-72-50HP for 72-Ohm Small Coax

Either Model
\$3.57
Amateur Net
Add 25¢ postage

TERMS: Cash with order, or 25%
deposit, balance C.O.D.

SREPCO Inc.
STANDARD RADIO & ELECTRONIC PRODUCTS
155 E. Second St. • DAYTON 2, OHIO Tel. 749-7173

ALMO

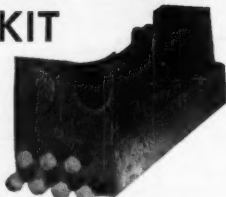
**SPOTLIGHT
SPECIAL**

ESPEY TV KIT

\$34.50 LESS
TUBES

No previous knowledge of TV necessary to build this kit. Brand new FREE instruction book included. Book shows step by step assembly. Kit includes all parts and book, less tubes. Tube kit, complete with CR... \$22.50

10% CASH WITH ORDERS



ALMO RADIO CO.

509 ARCH STREET • Philadelphia
6205 MARKET STREET • West Phila.
6th & ORANGE STS. • Wilmington
4401 VENTNOR AVE. • Atlantic City

16th DX Competition

(Continued from page 19)

full report will be carried in QST. In addition, special recognition will be made as follows:

a) Special certificates will be awarded to the 'phone and to the c.w. winners in each country (as shown in the ARRL Countries List) and in each of the 72 U. S. and Canadian ARRL sections (see page 6 of this issue) from which valid entries are received. Only single-operator stations will be eligible for these awards.

b) A suitable certificate will be awarded to the operator making the highest single-operator 'phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three 'phone entries by bona fide resident members of such club, and provided further that these scores are confirmed by receipt at ARRL headquarters of the individual contest logs from such members. The highest single-operator c.w. scorer in each club will be awarded a certificate under the same conditions.

c) ARRL will award a gavel to the affiliated club submitting the greatest aggregate 'phone and c.w. score by bona fide resident club members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL headquarters of the individual contest logs from such members.

13) **Judges:** All entries will be passed upon by the ARRL Award Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

14) **Disqualifications:** Off-frequency operation (as confirmed by a single FCC citation or advisory notice or two accredited official observer measurements) will disqualify. Low tone reports in logs will also be considered by the ARRL Award Committee as grounds for disqualification.

Happenings

(Continued from page 31)

to be unable to appear for examination at the time and place designated by the Commission.

Technician Class.—Any citizen of the United States.

Novice Class.—Any citizen of the United States except a former holder of an amateur license of any class issued by any agency of the United States government, military or civilian.

Section 12.23 is amended to read as follows:

§ 12.23 Classes and privileges of amateur operator licenses.

Amateur Extra Class.—All authorized amateur privileges including such additional privileges in both communication and technical phases of the art which the Commission may consider as appropriately limited to holders of this class of license.

Advanced Class.—All amateur privileges except those which may be reserved to holders of the Amateur Extra Class license.

General and Conditional Classes.—All authorized amateur privileges except the use of radiotelephony on the frequency bands 3800 to 4000 kilocycles, and 14200 to 14300 kilocycles and except those which may be reserved to holders of the Amateur Extra Class license.

Technician Class.—All authorized amateur privileges in the amateur frequency bands above 220 megacycles.

Novice Class.—Those amateur privileges as designated and limited as follows:

(a) The d.c. plate power input to the vacuum tube or tubes supplying power to the antenna shall not exceed 75 watts.

(b) Only the following frequency bands and types of emission may be used, and the emissions of the transmitter must be crystal-controlled:

(1) 3700 to 3750 kc, radiotelegraphy using only type A1 emission in accordance with the geographical restrictions set forth in § 12.111(a)(2)(i).

(2) 26.960 to 27.230 Mc, radiotelegraphy using only type A1 emission.

(3) 145 to 147 Mc, radiotelegraphy or radiotelephony using any type of emission except pulsed emissions and type B emission.

Section 12.27 is amended to read as follows:

§ 12.27 Renewal of amateur operator license.

(a) An amateur operator license, except the Novice

(Continued on page 110)

Our 27th Year

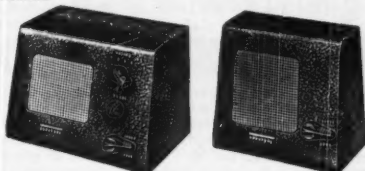
LEEDS
The Home of RADIO

QUALITY - PRICE
DEPENDABILITY

WORNER COMMUNICATING SYSTEMS

HANDLES 2 TO 6 STATIONS

Talk to anyone without leaving your desk. It's a great time and shoe leather saver. Works very efficiently up to 2000 feet. Is so sensitive you can talk and hear as far as 25 feet away from speaker. Yet complete privacy when close and complete silence between calls. Average system consumes about 20c in electric current monthly 110-120 volt A.C. or D.C. Shipped complete with wiring diagram and simple instructions for installation.



P-359 MODEL P-359 SELECTIVE MASTER STATION. Handles 1 to 5 Sub-Stations. 3-tube amplifier. 1 watt output. 5-inch speaker. In all-metal cabinet; size 9"x6 1/4"x6". Finished in hammered walnut lacquer finish. **\$24.25**

P-353 MODEL P-353 COMBINATION MASTER STATION. 2 to 5 units may be used, in any combination of Masters to Masters, or Masters to Sub-Stations. 3-tube amplifier. 1 watt output. 5-inch speaker. Will communicate both ways. In all-metal cabinet. Size 9"x6 1/4"x6". Finished in attractive hammered lacquer finish. **\$27.90**

P-360 MODEL P-360 SUB-STATION. Has 5-inch speaker. Talk-listen switch used by Sub to originate call; not used after Master answers. In all-metal cabinet. Size 7 1/4"x4"x6". Finished in attractive hammered walnut lacquer finish. **\$8.75**

PLATE TRANSFORMERS

For Small Transmitters. DC Voltage Ratings are Approx. Values Obtained at Output of a 2 section Choke input Filter. Using Mercury Vapor Rectifier Tubes Pri. is for 115 V. 60 cy.

Type No.	Sec. DC Volts	Sec. DC MA.	H.	W.	D.	Price Each
P 57	660-660†	500	4 1/2	3 1/2	4 1/2	\$ 6.76
P 58	550-550	400				
	1080-1080	1000*	12 1/2	4 1/2	3 1/2	8.23
	500-500	400	150			
P 59	900-900	750	22 1/2	4 1/2	3 1/2	7.94
	800-800	600				
P 67	1450-1450	1200	300	5 1/2	6 1/2	19.84
	1175-1175	1000				
P 68	2100-2100	1750	300	5 1/2	6 1/2	24.99
	1800-1800	1500				

* For dual operation with simultaneous use of both sec ratings. † Has 40-volt bias tap.

SUPERIOR POWERSTATS

Smooth, efficient voltage control. 0 to 135V. output from 115V. AC line.

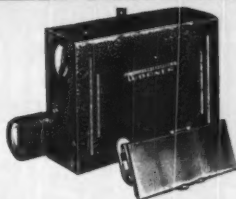
Type 20 (illustrated) 3 amps. **\$12.50**
116 for table mtg 7.5 amps. **23.00**
116U for panel mtg 7.5 amps. **18.00**
1126 15 amps. **46.00**
1156 45 amps. **118.00**

Also available for 230 volt input. Write for descriptive literature.

FILAMENT TRANSFORMERS

Type 940	2.5VCT @ 10 Amps.	7500V Ins.	\$2.79
Type 040	5 VCT @ 3 Amps.	2500V Ins.	\$2.06
Type 941	5 VCT @ 6 Amps.	2500V Ins.	\$2.35
Type 943	5 VCT @ 20 Amps.	2500V Ins.	\$5.29
Type 946	6.3VCT @ 3 Amps.	2500V Ins.	\$1.91
Type 947	6.3VCT @ 6 Amps.	2500V Ins.	\$2.79
Type 948	6.3VCT @ 10 Amps.	2500V Ins.	\$3.67
Type 960	7.5VCT @ 4 Amps.	2500V Ins.	\$2.35
Type 143	7.5VCT @ 8 Amps.	2500V Ins.	\$4.12
Type 146	10 VCT @ 10 Amps.	3000V Ins.	\$4.99
Type 961	Dual 6.3VCT @ 3 Amps.	2500V Ins.	\$3.38
Type 041	5VCT @ 3 Amps.	2500V Ins.	\$3.38
	6.3VCT @ 3.6 Amps.		

WORNER FOTOELECTRIC ANNOUNCER



MODEL 61A. Unit is designed to project a beam of light across any entrance to any room, building or premise. The breaking of this light beam will activate a chime or other sound device to automatically announce the "Entrant." Comes equipped with an optical system to arrest unwanted light. This allows installation in the direct rays of natural or artificial light. Complete with light source, sensitive photo-cell unit, mirror, chime for 115V. A.C., 60 cycle. **\$18.05**
Size 10 1/4"x7 1/2"x2 3/4". Weight 3 3/4 lbs.

NOW... QUICKLY AND EASILY CUT SQUARE & OBLONG OPENINGS IN RADIO CHASSIS

Greenlee No. 731 square punches are time saving tools that pay for themselves.

5/8" square	\$2.95	3/4" square	\$3.44
1" square	\$3.97		
Standard Greenlee No. 730 punches size 1/2" to 3 1/2" diameter, in stock.			
1/2", 3/4", 7/8"	\$1.94	1 1/2"	\$2.52
1"	\$2.12	1 3/4"	\$2.54
1-1/16", 1 1/8", 1-5/32"	\$2.25	2 1/4"	\$5.37
1-3/16", 1 1/4"			

VFO FOR MOBILE RIGS

The new Lyco Model 381 mobile VFO. 6AK6 Buffer, Stable 6C4 "Clapp" Oscillator. 6AK4 Doubler supplies plenty of drive to replace 3.5 or 7 MC crystal. Direct reading, illuminated slide rule dial. Ideal size, 3"x4 1/4"x5". Operates on 200 to 400 @ 25 MA D.C. Complete with tubes ready to go. **\$21.95**



CHOKES

SMOOTHING TYPE	HY	SWINGING TYPE	HY	MA	PRICE EACH
C-80	10	C-87	4-16	150	\$3.09
C-81	10	C-88	4-16	200	\$3.82
C-82	10	C-89	4-16	250	\$3.29
C-83	8	C-90	3-14	300	\$5.59

All above 3000 Volts Insulation

RAYTHEON VOLTAGE STABILIZERS

Positive Stabilization $\pm 1/2\%$
Input 95-130 volts, 60 cycles single phase; output 115 volts stabilized to $\pm 1/2\%$. *Output 6.0 or 7.5 volts stabilized $\pm 1/2\%$.

Catalog No.	Cap. wgt. Warts lbs.	Net Price
VR-6110	15 4	\$15.00
VR-6101*	30 5	\$17.00
VR-6111	30 5	\$17.00
VR-6112	60 8	\$24.00
VR-6113	120 14	\$31.00
VR-6114	250 25	\$48.00
VR-6115	500 45	\$75.00
VR-6116	1000 92	\$125.00


If not rated: 25% with order, balance C. O. D. All prices F. O. B. our warehouse New York. No order under \$2.00. We ship to any part of the globe.

LEEDS RADIO CO.

75 Vesey Street
Cortlandt 7-2612

Dept. QS 1
New York City 7

JOBS in **TELEVISION**



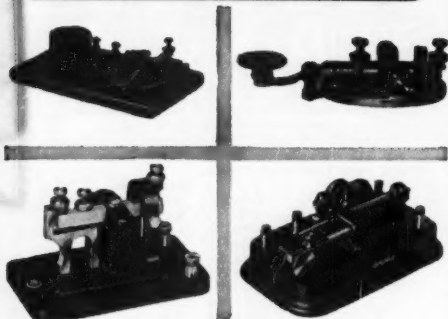
AMERICAN RADIO INSTITUTE
CAN TRAIN YOU FOR THIS JOB

New York
2010 B'way (68th St.)
Buffalo, N. Y.
640 Main St.

Syracuse, N. Y.
131 Shonnard St.
Mount Vernon, N. Y.
174 Gramatan Ave.

FREE EMPLOYMENT SERVICE • GI APPROVED

Signal Wireless and Telegraph Instruments



From practice keys for beginners to the very finest commercial equipment, perfect performance calls for Signal. Send for FREE descriptive literature today!

Signal ELECTRIC MANUFACTURING CO.
DEPT. D-7, MENOMINEE, MICHIGAN

Class, may be renewed upon proper application stating that the applicant has lawfully accumulated a minimum total of either 2 hours operating time during the last 3 months or 5 hours operating time during the last 12 months of the license term. Such "operating time", for the purpose of renewal, to be counted as the total of all that time between the entries in the station log showing the beginning and end of transmissions as required in § 12.136(a), both during single transmissions and during a "sequence of transmissions" as therein provided. The application shall, in addition to the foregoing, include a statement that the applicant can send by hand key (i.e., straight key or any other type of hand operated key such as a semi-automatic or electronic key), and receive by ear, in plain language, messages in the International Morse Code at a speed of not less than that which was originally required for the class of license being renewed.

(b) The Novice Class license will not be renewed.

(c) The applicant shall qualify for a new license by examination if the requirements of this section are not fulfilled.

(d) The renewal application shall be accompanied by the applicant's amateur operator license, and also by his amateur station license if he holds one.

(e) Application for renewal of an amateur operator license may be filed not earlier than 120 days prior to the date of expiration and not later than a period of grace of one year after such date of expiration. During this one year period of grace an expired license is not valid. A renewed license issued upon the basis of an application filed during the grace period will be dated currently and will not be back-dated to the date of expiration of the license being renewed. This one year period of grace shall apply only to licenses expiring on or after January 1, 1951.

(f) Renewal applications shall be governed by applicable rules in force on the date when application is filed.

Section 12.29 is amended to read as follows:

§ 12.29 License term. — Amateur operator licenses are normally valid for a period of 5 years from the date of issuance of a new or renewed license, except the Novice Class which is normally valid for a period of 1 year from the date of issuance. Modified and duplicate licenses shall bear the same date of expiration as the licenses for which they are modifications or duplicates.

Section 12.42 is amended in the following particulars:

1. Element 1 is amended to read as follows:

Element 1. Code test. — Ability to send by hand key (i.e., straight key or, if supplied by the applicant, any other type of hand operated key such as a semi-automatic or electronic key), and receive by ear, in plain language, messages in the International Morse Code at a speed of not less than 13 words per minute, free of omission or other error for a continuous period of at least 1 minute, during a test period of 5 minutes, counting five characters to the word, each numeral or punctuation mark counting as two characters.

2. A new element designated as Element 1(E) is added to read as follows:

Element 1(E) Code test. — Ability to send by hand key (i.e., straight key or, if supplied by the applicant, any other type of hand operated key such as a semi-automatic or electronic key), and receive by ear, in plain language, messages in the International Morse Code at a speed of not less than 20 words per minute, free of omission or other error for a continuous period of at least 1 minute, during a test period of 5 minutes, counting five characters to the word, each numeral or punctuation mark counting as two characters.

3. A new element designated as Element 1(NT) is added to read as follows:

Element 1(NT). Code test. — Ability to send by hand key (i.e., straight key or, if supplied by the applicant, any other type of hand operated key such as a semi-automatic or electronic key), and receive by ear, messages in plain language in the International Morse Code at a speed of not less than 5 words per minute, free of omission or other error for a continuous period of at least one minute during a test period of five minutes, counting five characters to the word, each numeral and punctuation mark counting as two characters.

4. A new element designated as Element 3(N) is added to read as follows:

Element 3(N). Rules and regulations essential to begin-

(Continued on page 112)

IT'S HERE!

LEO'S 1950 CATALOG

What every ham has
been waiting for!
YOURS FOR THE ASKING

A brand new catalog containing the most complete listing of radio and television parts and accessories—everything for the radio man and the amateur. We feature well known nationally advertised brands at lowest prices. Get acquainted and save money dealing with WRL—"The World's Largest Distributor of Amateur Radio Transmitting Equipment".

**SEND FOR YOUR FREE COPY
TODAY!**

NEW WRL "400"

GLOBE KING "More Watts Per Dollar"



A versatile, advance design transmitter that gives efficient performance on all bands—10 to 160 on phone and CW. 350 watt phone—400 watt CW. Provisions for ECO. Complete with one set of coils.

WIRED \$399.45 KIT FORM \$379.45

Low Down Payments
Write For Detailed Specification Sheet

WRL 175 WATT GLOBE CHAMPION



R. F. Section a complete 175 watt XMTR. Provisions for ECO. Automatic fixed bias on Final and Buffer.. Class B Speech Modulator. 175 watt input—10 thru 160 meter bands. Complete with tubes, meters, and 1 set of coils.

\$299.00 WIRED KIT FORM \$279.00
Low Down Payments

Write For Detailed Specification Sheet



GIANT RADIO REFERENCE MAPS

Just right for your control room walls. Approximately 28" X 36". Contains time zones, amateur zones, monitoring stations. Mail coupon today and

25c

FAST SERVICE ON FOREIGN ORDERS

CU ON 10-20 & 75
METERS

LEO I. MEYERSON
WØGFQ



WRITE - WIRE

PHONE 7795

World Radio
LABORATORIES INCORPORATED
COUNCIL BLUFFS, IOWA



World Radio Laboratories, Inc.
744 West Broadway
Council Bluffs, Iowa

Please send me:

- ☐ Radio Map ☐ Globe King Info
☐ New Catalog ☐ Globe Champion Info
☐ List of Used Equipment

Name _____

Address _____

City _____

State _____

ATTENTION MOBILE HAMS

Complete mobile package — nothing else to buy. Outstanding mobile signals use motorola equipment — backed by years of communication equipment experience — World's largest producer of 2-way mobile equipment.

A mobile transmitter with a double feature FM or AM at flip of the switch, the MOTOROLA FMT-30-DMS (27-30 MC.). **\$130.00**

MOTOROLA P-69-13-ARS receiver with special noise limiter for use with any converter having 1500-3000 KC. **\$60.00**

P-7253 spring base rear — mount antenna **\$22.50**

3-30 famous Gon-set converter complete to connect to the P-69-13-ARS receiver.... **\$39.95**

P-327-E Fire wall loud speaker.... **\$5.00**

The above comes complete with all necessary accessories and mounting hardware. Order direct or through the Motorola National Service Organization member in your area.

For further information write to:

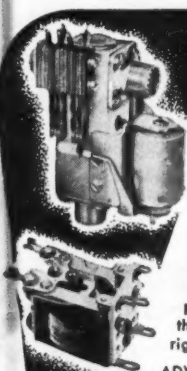
MOTOROLA INC.

Amateur Sales Dept. QST-JAN.

1327 W. Washington Blvd. Chicago 7, Illinois

Attention: Harry Harrison W9LIX

Telephone—Taylor 9-2200 Ext. 161



ADVANCE RELAYS designed for your application

Soundly engineered and built to famous standards of performance—you can install these outstanding relays in your rig with complete confidence.

ADVANCE offers a complete line of Time Delay, Overload, Antenna and Keying Relays with wide variations of types for special applications. Your inquiry will receive prompt and courteous attention.

Illustrated are
Coaxial & 300
ohm line relays

ADVANCE RELAYS

ADVANCE ELECTRIC & RELAY CO.
1260 WEST SECOND STREET • LOS ANGELES 26, CALIFORNIA

ners' operation, including sufficient elementary radio theory for the understanding of these rules.

5. A new element designated as Element 4(E) is added to read as follows:

Element 4(E). Advanced radio theory and operation as utilized in modern amateur techniques, including, but not limited to radiotelephony, radiotelegraphy, transmissions of energy for measurements and observations applied to propagation, to the radio control of remote objects and for similar experimental purposes.

Section 12.43 is amended to read as follows:

§ 12.43 Elements required for amateur operator license examinations:

Amateur Extra Class. — Examination consists of elements 1(E), 2, 3 and 4(E).

Advanced Class. — Examination consists of elements 1, 2, 3 and 4.

General Class and Conditional Class. — Examination consists of elements 1, 2 and 3.

Technician Class. — Examination consists of elements 1(NT), 2 and 3.

Novice Class. — Examination consists of elements 1(NT) and 3(N).

Section 12.44 is amended to read as follows:

§ 12.44 Manner of conducting examinations.

(a) The examinations for all classes of amateur operator licenses, except Conditional Class, will be conducted by an authorized Commission employee or representative at locations and at times specified by the Commission provided that the examination for Technician and Novice Classes may be conducted as set forth in (c) below under the following circumstances:

(1) If the applicant's actual residence and proposed amateur station location are more than 125 miles air line distant from the nearest location at which examinations are held at intervals of not more than 3 months for amateur operator license; or if the applicant is shown by physician's certificate to be unable to appear for examination because of protracted disability; or is shown by certificate of the commanding officer to be in the armed forces of the United States at an Army, Navy, Air Force or Coast Guard station and, for that reason to be unable to appear for examination at the time and place designated by the Commission.

(b) A holder of a Technician or Novice Class license obtained on the basis of an examination under the provisions of (c) below is not required to be re-examined when changing residence and station location to within a regular examination area, nor when a new examination location is established within 125 miles of such licensee's residence and station location.

(c) Each examination for Conditional Class, and for Technician or Novice Class licenses, under the conditions set forth in paragraph (a)(1) above, will be conducted and supervised by not more than two volunteer examiners, whom the Commission may designate or permit the applicant to select; in the event the examiner for the code test is selected by the applicant, such examiner shall be the holder of an Extra Class, Advanced Class or General Class of amateur operator license or shall have held, within the 5 years prior to the date of the examination, a commercial radiotelegraph operator license issued by the Commission or within that time shall have been employed in the service of the United States as the operator of a manually operated radiotelegraph station. The examiner for the written test shall be at least 21 years of age.

Section 12.46 is amended to read as follows:

§ 12.46 Examination credit. — An applicant for a higher class of amateur operator license who holds a valid amateur operator license issued upon the basis of an examination by the Commission will be required to pass only those elements of the higher class examination that were not included in the examination for the amateur license held when such application was filed. However, credit will not be allowed for licenses issued on the basis of an examination given under the provisions of § 12.44(c).

An applicant for Amateur Advanced Class operator license will be given credit for examination element 4 if within 2 years prior to the receipt of his application by the Commission he held Class A privileges or an Advanced Class license.

An applicant for any class of amateur operator license, except the Extra Class, will be given credit for the telegraph code element if within 5 years prior to the receipt of his application by the Commission he held a radiotelegraph

(Continued on page 114)

Build Your Career! Become an ELECTRICAL ENGINEER

★ *Major in Electronics*

★ *B. S. Degree
in 36 Months*

THE ELECTRICAL ENGINEERING course offered by this non-profit, 46-year-old Technical Institute and College is world famous. Save a valuable year by gaining your *major in Electronics* and a Bachelor of Science degree in 36 months of year-round study.

Follow an industry-guided program which is constantly attuned to current developments. It presents a solid program in the basic sciences . . . chemistry, physics, mathematics, economics and electrical engineering subjects . . . plus 19 technical specialty courses in Engineering Electronics, including four courses in electronic design.

You are invited to request helpful guidance literature which illustrates how your electronic interests can be the foundation of a worthwhile career.

- Over 30,000 graduates and 1,555 students
- Faculty of 85 specialists
- Train in modern, well-equipped shops.



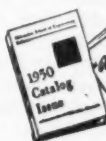
A Special Preparatory

program is offered for students who wish to review basic subjects or who require added background.

Practical, Academic or Military training will be evaluated for advanced credit.

**NEXT TERMS OPEN
APRIL 3 ... JULY 3**

WRITE today for the helpful 48-page pictorial bulletin, "Your Career"; and the 110-page 1950 catalog.



AN EXPANDING INDUSTRY

ELECTRONICS is of tremendous, growing importance to industrial applications—high frequency heating, power system control, air conditioning, printing, welding and many others. And business leaders predict television will be among America's top ten industries by 1951. Prepare now to become an Electrical Engineer, with a specialized, practical background to capitalize on all these fast-growing opportunities.

In one year of study, become an ELECTRONIC TECHNICIAN

This certificate is yours at the end of 12 months of study in the Electrical Engineering Course.

Prepare Here for a Career in RADIO AND TELEVISION

In 18 months you can become a Radio-Television Technician, ready for positions in receiver and transmitter testing, servicing, sales, supervision and production. Because of this school's *concentric curriculum*, the Bachelor of Science degree in Electrical Engineering (Electronics Major) may be earned in 24 additional months.

MILWAUKEE
SCHOOL of ENGINEERING
Founded 1903 by Oscar Werwath



MILWAUKEE SCHOOL
OF ENGINEERING

Dept. Q-150, N. Broadway and E. State, Milwaukee, Wis.

Without obligation, send ☐ 48-page pictorial bulletin, "Your Career"; ☐ 110-page 1950 Catalog. I am interested in course.

NAME AGE

ADDRESS

CITY STATE ☐ Veteran of World War II

**NOW... Quickly and Easily
cut SQUARE and OBLONG
openings in radio chassis**



**WITH THE GREENLEE No. 731
SQUARE RADIO CHASSIS PUNCH**

Now, in 1½ minutes or less you can do hole-cutting jobs that might take an hour or so with old "drilling and filing" methods. Simply insert GREENLEE Punch and turn with an ordinary wrench; a "clean" square or oblong opening is quickly cut. An indispensable, timesaving tool that pays for itself in a hurry.



In sizes ½", ¾" and 1"

Write today for facts and prices on this handy Punch.
Greenlee Tool Co., 1861 Columbia Ave., Rockford, Illinois

A COMPLETELY NEW TRYLON MAST

**...at a cost within
amateur budgets**

The new TRYLON #650 double-welded antenna mast weighs only 2 lbs. per foot; is easy to erect and climb; gives you a mast height of from 10 to 60 feet; and costs little more than \$1 per foot complete with fittings! It is hot-dipped galvanized after fabrication and comes in handy 10 ft. sections. The ideal support for doublet, rhombic or other wire-type antennas; lightweight rotary beams or for portable antennas at field meets! Featured by leading distributors. Write for free folder.

**Tower and Antenna Division
WIND TURBINE COMPANY
WEST CHESTER, PENNA.**

first or second class operator license issued by the Federal Communications Commission.

No examination credit, except as above provided shall be allowed on the basis of holding or having held any amateur or commercial operator license.

Section 12.65 is amended to read as follows:

§ 12.65. License period. — The license for an amateur station is normally valid for a period of 5 years from the date of issuance of a new or renewed license, except that an amateur station license issued to the holder of a Novice Class amateur operator license is normally valid for a period of 1 year from the date of issuance. Modified or duplicate licenses shall bear the same issue date and expiration date as the licenses for which they are modifications or duplicates.

Single Sideband

(Continued from page 38)

the number of tubes in my s.s.b. rig and the old a.m. rig, and I come up with three less tubes in the present layout!"

Dick at W3ASW has a new filter using the design of W0MNN and toroid forms from some old telephone loading coils. He and W4OLL were the 75-meter stations that worked DL4PA on 14 Mc. via W3FRS, as reported last month. But the one we like is the time Dick was duplexing on 75 with both W2SHN and W2VVC, who were both on the same frequency. Hoagy asked for some information Dick had in the next room, and while Dick left his rig (turned on) to get the dope, SHN and VVC called and worked each other duplex with W3ASW as the connecting link. This generated the idea that with one noble character serving as the relay point on one frequency, a bunch of s.s.b. stations on another frequency could have a duplex round table! It might bring up a little problem of proper signing and identification, which could no doubt be ironed out to the satisfaction of the FCC, but it certainly opens up some possibilities. Dick now has his station rigged so that he doesn't need the 'speaker-to-microphone acoustical link to act as a relay.

We mentioned last month how W2KUJ and W4OLL had polled all of the s.s.b. operators for their opinions about an exclusive assignment for the stuff and found the majority opinion against it. However, we continually receive letters at Headquarters suggesting a small exclusive assignment "to see what s.s.b. will do and to set off a small band where we can find these stations." If we may intrude a personal opinion at this point, it seems to us that it would be much better if, at some future date when the roster shows 50 or 75 active stations across the country, the League were to approach the FCC to see if the s.s.b. gang might be permitted a small exclusive assignment for 24 or 48 hours, during which time all of the active stations would spend as much time as possible in demonstrating s.s.b. techniques. The nonparticipating but interested amateurs could then spend all the time they wanted in observing what an exclusive s.s.b. band would be like. This is just a personal thought, of course, and right now we don't have enough active stations across the country to make it worth while. But the time is rapidly approaching, because there are new ones showing up all the time. What do you think? — B. G.

Get it at ... WHOLESALE RADIO of BALTIMORE

Low Prices and Quick Service for the Amateur

Sensational GE 33 1/3 Player Value!

With New Variable Reluctance Cartridge

GE Model 19—PLASTIC TABLE TYPE ELECTRONIC LP PLAYER

Think of it... a complete GE long-playing player for little more than the cost of the reluctance cartridge alone. We bought a close-out lot cheap... but very cheap. And mister... look at the saving we're passing along to you. Has molded one-piece streamlined plastic cabinet. Plays 33 1/3 microgroove records with the most beautiful record reproduction you ever heard. Plays through any radio phonograph with addition of any preamplifier. 14 5/8" wide, 4 1/4" high and 10 1/2" deep. Get yours now... while they last.

GE PHONO-PREAMPLIFIER. Built-in Power Supply\$9.57



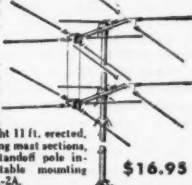
Reg. Price \$19.95
While They Last \$6.95

BEST FOR THE FRINGE AREAS

SNYDER LAZY XX TV ANTENNA

Complete with three 3 1/2 ft. mast sections and adjustable mounting base.

Completely pre-assembled. Just unfold, tighten and erect. Extremely hi-gain. Matches 72-300 ohm lead. All TV channels and FM. Overall height 11 ft. erected. Complete with 3 mating mast sections, guy wire anchors, stand-off pole insulators and adjustable mounting base. Order model TX-2A.



\$16.95

TV ANTENNA ACCESSORIES

- STEEL EXTENSION POLES, .00 ft. long, 1 1/4" d. Weather treated..... \$1.95
- ANTENNA SWIVEL BASE..... .39
- GUYWIRE, 6 stranded No. 20. Per 50 ft..... .29
- 24 reels, 50 ft. each, interconnected..... 6.00
- 72 OHM COAXIAL CABLE RG59U (4¢ per ft.)..... 3.75
- 300 OHM TWIN LEAD (\$1.45 per 100 ft.)..... 11.75
- 1000 ft.
- CHIMNEY MOUNT BRACKETS, Complete with strap..... 1.59
- HI-BAND ADAPTER, Folded dipole and reflector. Clamps on existing pole..... 2.00
- 3 1/4" — 300 OHM STANDOFF INSULATORS, Wood screw-in type (3¢ ea.) per hundred..... 2.75
- SAMS TV ANTENNA MANUAL..... 1.25

SNYDER HI-LO ARRAY Complete with two Sensational TV Antenna Buy! 3 1/2 ft. mast sections



We don't believe you'll find a finer antenna anywhere near this low price. Two folded dipoles. (High and low) with reflectors. Complete with two 3 1/2 ft. mast sections, guy ring, stand-off insulators. Ready for easy, quick installation. Order model TV-21.

\$5.95

Snyder "IN-LINE" TV Antenna

Just unfold, tighten and erect! Matches input of nearly all TV sets. Unidirectional pattern over both bands eliminates "Ghosts" caused by multipath signals. Complete with mast and mounting bracket. Order model TV-16.



\$8.65

MIDGET 300 OHM LINE ANTENNA RELAY



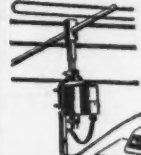
Double Pole, Double Throw 300 ohm transmit-receive relay. Up to 500 watts R.F. on reasonably flat lines. (Measured on input.) Silicone glass insulation.

Advance relays

K 1504 R.F. 115 ACV \$2.70
K 1604 R.F. 6 DCV each

Brings In The Stations You Couldn't Get Before Alliance TENNA-ROTOR. For Rotating TV, FM & Amateur Antennas

Get wider range and sharper TV pictures. The rotor is sturdy, water-tight and metal housed. The plastic control box (5" sq.) plugs into any 60 cycle 110 V. outlet. You get antenna rotator and control case. Order model ATR. Max. allowable ant. weight — 20 lbs.



\$23.97

ALLIANCE THRUST BEARING. This should be used on installations where the antenna weighs in excess of 20 pounds..... \$4.77

CABLE FOR TENNA-ROTOR. Flat, four conductor, interconnecting cable, per ft..... .3c

Per 100 ft..... \$2.75

COMPARE AND SAVE ... ON THESE WHOLESALE SPECIALS

Check These Low Prices

ALNICO "5" PM SPEAKERS

SQUARE	8"	8 1/2"	4" x 6"	4" x 8"
4"	\$1.29	\$2.39	\$1.49	\$2.49
6"	\$1.39	\$2.29	\$1.79	\$2.49
8"	\$1.49	\$2.19	\$1.99	\$2.49



Wheeler Sound-Powered TELEPHONE HANDSET

No Batteries
No Power Supply Needed
High fidelity speech transmission. Perfect for stores, homes and auto installations. Order model SPT-102. each \$17.50 per set of two.



72 to 300 OHM MATCHING TRANSFORMER

Matches 72 ohm coaxial cable such as RG59/U to 300 ohm receiver. Voltage step-up 2:1 with a flat response over the TV channels from 52-215 mc. Negligible mismatch when used with 52 ohm coaxial cable and W-100 adapter. Model T-72..... \$2.40



Freq. Response — 50-13,000 Cycles

G.E. HIGH FIDELITY 1201 PM SPEAKER

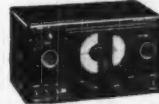
For custom installation. Deluxe 12" Alnico "V". 14.5 oz. 8 ohm voice coil. 25 watts..... \$17.70



NEW GE TRIPLE PLAY CARTRIDGE

Plays all three speeds, 33 1/3-45-78 rpm. Dual stylus. Order model RPX 050..... \$8.27

New Low Price! Model S-38A HALLICRAFTERS RECEIVER



Gives outstanding reception at a moderate price. Standard broadcast plus 2 short wave bands. Built-in PM speaker. Continuous AM band 540 kc to 32 mc. 4 tubes plus rect..... \$39.95

WE HAVE COMPLETE LINE OF HALLICRAFTERS RECEIVERS

SK-71.....	\$178.50	S48A.....	\$ 78.95
S-72.....	78.95	SX-42.....	159.50

NEW TRIPLETT Volt-Ohm MIL-AMMETER

Model 666-R \$24.50

DCV: 0-10-50-250-1000-5000, at 1000 ohms per volt. ACV: same as DCV. DCM: milliamperes: 0-10-100, at 250 millivolts. MEG: OHMS: 0-3000-300,000 (20-2000 center scale) MEG: OHMS: 0-3 (20,000 ohms center scale).



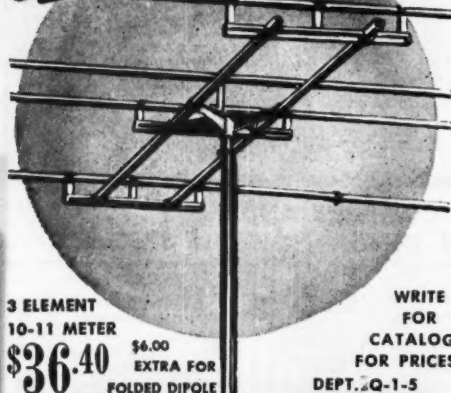
OIL-FILLED CONDENSER 10 MFD 600 V 95c

WRITE FOR FREE "FYI" BULLETIN

Address orders to Dept. QS-102 or Call Mulberry 2134

WHOLESALE
RADIO PARTS CO., Inc.
311 W. Baltimore St.
BALTIMORE 1, MD.

HY-LITE BEAMS



3 ELEMENT
10-11 METER
\$36.40 \$6.00
EXTRA FOR
FOLDED DIPOLE

WRITE
FOR
CATALOG
FOR PRICES
DEPT. Q-1-5

HY-LITE Antennae INC.
Makers of Fine Antennas for AMATEUR · FM · TELEVISION
1060 WASHINGTON AVE., BRONX 86, N. Y.

BURSTEIN-APPLEBEE
1012-14 MCGEE STREET.
KANSAS CITY 6, MISSOURI

80, 75 and 40 Meter CRYSTALS Assortment of TEN only \$3.95



In FT 243 holders, cut from highest quality quartz accurately ground and acid etched. Frequency marked on each within 2 KC. Sorry we must sell them in assortments our pick of frequencies — But you can't go wrong! There are choice frequencies for 80, 75 and plenty for 40 meters or for doubling to 20 and 10 meters in each assortment. Everyone guaranteed to be an active oscillator. No. 21T3991. Assortment of TEN. **\$3.95 ONLY**

**RADIO
TELEVISION
ELECTRONIC**
Catalog No. 501
BURSTEIN-APPLEBEE

CATALOG No. 501 FREE Did You Receive It?

Catalog No. 501, 144 big pages being mailed to Dealers, Servicemen, Broadcast Stations, Schools, Factories, Public Utilities, Laboratories, Engineers, Amateurs, Experimenters.

BURSTEIN-APPLEBEE CO.
1012 McGee St.,
Kansas City 6, Mo.

**Check
Coupon
for FREE
Catalog**
Enclose payment for Merchandise

Send me your FREE catalog. Send Crystal Assortment No. 21T3991. Payment of \$_____ enclosed.
NAME _____
ADDRESS _____
TOWN _____ STATE _____

How's DX?

(Continued from page 41)

W3LYK/KC4 renown. W3LYK is now extremely occupied with the maintenance of a string of radio communications in the vicinity of the Khyber Pass in Afghanistan. Of paramount interest is the fact that he disowns any knowledge of the operations of YA3B or any other contemporary claimers to YA locations. He'll remain there for an indefinite period longer but is growing quite homesick for his old Antarctic stamping grounds. Licensing machinery is now functioning in Poland, vouchers W2QHH. Prewar veterans will display SP1 labels while SP5 will designate new blood in the ranks. PX1A (no, Jeeves, the real one) lost his 803 rig recently by lightning after fifteen years of faithful service and is in dire need of replacement gear. For obvious reasons he cannot stroll over to a supply house for a refill and consequently wonders if any of the W gang could lend a hand. Rick has a particular yen for an 803 and a 2000-volt hummer to match although he'll be grateful for other equivalent components instead. Post via P. O. Box 273, Chihuahua, Mexico, and this, incidentally, is also his address for QSLs. Allow us to make a correction here of W8CDP's 15th ARRL DX Test scores as published in a previous QST. His 'phone tally was inadvertently listed in the c.w. section and his c.w. total omitted. W8CDP placed second in Colorado with 10,191 points on c.w. and fourth in his section on 'phone with 855. Those of the faithful who conversed with PK2AM on 20 meters during June, 1949, will be interested to learn that all is well and that you may reach him with a card now through ARRL. The gentleman survived a rough spell during hostilities over there but is at a loss for gear. He trusts to become active again in the near future. W6AOA furnished his first DX QSO. VR5PL informs us of his new 3-year contract with the Tongan government radio station and ventures to say that the entire pack of W/VEs may yet get a crack at him. [No good, boss. At 50 Ws a day for 1095 days you'd still be out in the cold. — Jeeves] Hmph. At the moment, however, Noel needs a power pack for his 807s and the other ham on the island is awaiting chokes for his modified ART-13; that would be VR5GA. VR5PL contemplates 10-meter activity at 0100-0200 and 0400 onward daily plus week-end sessions between 2000 and 0700 GCT using a.m., n.f.m. and a.s.b., the latter due inspiration by W1DX. VR5s AF, IP and JA have all shipped out. KL7ZO blew back into Uncle Sugar and hasn't anything good to say about Alaskan propagation conditions. Stan fired up gear all over the Territory and found the best spot away up past the Arctic Circle bordering the waters. Frequent blackouts knock large holes in propagation charts and DX skeds are pretty tough to maintain, especially during winter. Mail sent to 8637-138 St., Jamaica, L. I., N. Y., will reach KL7ZO/W2. Anticipating much activity on ten and twenty this season, ZS9D would have it known that all QSLs received by him are answered immediately. Ivan uses fifty watts and an SX-28. Word from VP4LC (ex-VP4TAC) specifies that Trinidad three-letter calls are being switched to two-letter jobs because the former are too similar to commercial assignments. The Z86VMO active for a few days in December last was a specially authorized station operating at the unveiling of Monument Koppie, a Voortrekker commemoration near Pretoria, attended by over 100,000. Distinctive QSLs will be issued and all cards received will be kept on permanent display in the monument. Some joy boy has been borrowing VR2BC's call for use on 14-Mc. c.w. and naturally QSLs for these contacts must go unverified. The legit VR2BC is up to snuff on his confirmations, all sent by bureau. What is more, there are no jake three-letter calls in Fiji. VR2AQ has closed down for reassignment but VR2AP will return to action after his New Zealand leave about February. A card from North Carolina will complete a hard-earned WAS for VR2BC. FEARL Prexy JA2GY reports good reception of the Voice of America's amateur radio feature program from Hawaii on Sundays although the 15.25-Mc. outlet has been intermittently jammed. In the Northern California DX Club's *The DXer* we see that the boys have definitely tagged VR3AB and VK4SI/VR1 as leg-pullers and that CR1/AA is supposedly temporarily QRT for rebuilding purposes.

Groan. That boxing gloves Christmas gift to Jeeves was a sad thought. How were we to know he was once the Lancashire bug-weight champ?

ACCENT

ON COMMERCIAL APPEARANCE & EFFICIENCY

The NEW JOHNSON **VIKING I**
TRANSMITTER KIT ONLY \$209⁵⁰

Amateur Net

150 Watts Input on All Bands

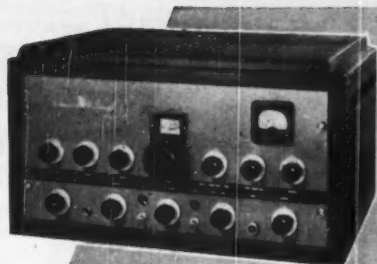
Here's a new transmitter whose superlative performance and operating convenience set new standards for amateur transmitters.

There's a full 100 watts output of AM phone, 115 watts cw on 160, 80, 40, 20, 15 or 10-11 meters at your fingertips.

The pi-section output stage will efficiently load many antennas without external couplers. The final tank coil is a variable inductor with excellent insulation and high Q throughout its range. Plug in coils are completely eliminated.

Novice or oldtimer can obtain brilliant performance from the Viking I. A punched chassis and panel, table cabinet, all parts, wiring harness and carefully detailed instructions furnished with each kit. Tubes, crystals, mike and key not included.

For Complete Information
See Your JOHNSON Jobber or
Write For Your Illustrated Folder Today!



Build It Yourself
In A Few Evenings

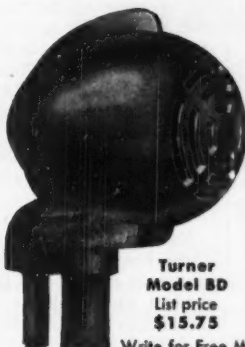
features

- Band Switching
- All Bands
- Continuous Tuning
- Final Tank
- Front Panel Controls
- Unique Pierce Oscillator
- VFO Input Receptacle
- 10 Crystal Positions
- Pi-Network Coupling
- Freedom from Parasitics
- Two Complete Power Supplies
- All Stages Metered
- Desk Cabinet, 11 3/16" x 15" x 21"
- Two-tone Panel

E. F. JOHNSON CO.

Waseca, Minnesota

SO MUCH FOR SO LITTLE



Turner
Model BD
List price
\$15.75

Gentlemen:

I am sending one of your pre-war, high impedance dynamic microphones which I purchased in 1941. (Model BD). This microphone has had a pretty rugged existence. In addition to pre-war and post-war use in the "Ham Shack," it went overseas and saw plenty of service on P.A. systems during my tour of duty with the Navy. The mike has lost none of its response and was in use right up until this letter was written. I have been frustrated lately with the intermittent cord which decides to open at the most inopportune time. I am enclosing a check for a new cord and plug.

I want to compliment you on the design of a very rugged and dependable microphone. I never expected so much from a unit selling for such a low price.

Sincerely yours,

Lyman H. Howe
W2TJH

Write for Free Microphone literature

In Canada: Canadian Marconi Company, Montreal, P. Q.

Export: Ad. Auriema, Inc., 89 Broad Street, New York 4, N. Y.

THE TURNER COMPANY

917 17th Street, N. E.

Cedar Rapids, Iowa

Microphones by **TURNER**



Microphones licensed under U.S. patents of the American Telephone and Telegraph Company, and Western Electric Company, Incorporated. Crystals licensed under patents of the Brush Development Company.

MORE SIGNALS PER DOLLAR
From Money Invested in an Antenna

Self Supporting
STEEL TOWERS
For Rotary Beams, FM TV

ATTRACTIVE—NO GUY WIRES!

- 4-Post Construction for Greater Strength
- Galvanized Steel—Will Last A Lifetime
- SAFE—Ladder to Top Platform
- COMPLETE—Ready to Assemble
- Easy to Erect or Move
- Withstands Heaviest Winds

(We will supply stress diagrams for your building inspector)

EASY MONTHLY PAYMENTS
Up to 12 Months to Pay!

All Vesto Towers are available on a special monthly payment plan which requires only 1/8 down. Write for free details.

Width at Base Equal to 1/5 Height

IMMEDIATE DELIVERY
on all 7 popular sizes. Note the low prices for these quality lifetime towers: 22'-\$73.50, 28'-\$92.25, 33'-\$109.75, 39'-\$129.75, 44'-\$149.75, 50'-\$175.00, 61'-\$239.75, 100'-

\$846.50. Towers are shipped to your home knocked down, FOB Kansas City, Mo., 4th class freight. Prices subject to change...so order now! Send check or money order...or write for free information.

WRITE TODAY FOR COMPLETE FREE INFORMATION AND PHOTOGRAPHS

The VESTO Company
101 Main St. Parkville, Mo.

COMMERCIAL RADIO INSTITUTE

A RADIO TRAINING CENTER FOR 29 YEARS

Resident Courses Only • Broadcast, Service, Aeronautical, Television, Radar, Preparatory Mathematics, Frequency Modulation and Marine telegraphy. Classes now forming for mid-year term Feb. 1st. Entrance examination Jan. 26th.

Literature upon request. Veteran training

Dept. B, 38 West Biddle Street, Baltimore 1, Maryland

Buy Direct from Indiana's Most Exclusive
"HAM-GEAR" and Television Supply House
New Models Now at Lowest Prices

• National
• Collins
• Hallicrafters

RME • RCA • B&W • Hammarlund • Astatic • Bliley
Presto • Stancor • Taylor • Triplett • Millen • Vibroplex • Johnson • Harvey-Wells

And 100 other top lines to choose from. Rush us your order now with a \$5.00 deposit for quickest possible delivery and lowest prices.

We're making deliveries NOW!

W9KJF W9VEK W9OET W9POC

VAN SICKLE
RADIO SUPPLY CO.

102 So. Penn St. Indianapolis 4, Ind.
(BC-610's in stock \$595 plus crating and shipping.)

Phase-Shift Networks

(Continued from page 46)

s and a correspond to those same parameters in Dome's article, while the Q in Luck's paper is equal to 1/s.

For the design described in the text, $s = 3.540$, $r = 1.970$, and $f_0 = 1000$ c.p.s. Using these values, the 89- and 90-degree points for the whole network can be calculated by solving (1) for f/f_0 . Similarly, the 90-, 180- and 270-degree check points for one channel can be found by equating (2) to +1, infinity, and -1, respectively, and solving for f/f_1 and f/f_2 .

If this is done, the 89-degree points occur at $f/f_0 = 0.3285, 3.044$. The 90-degree points occur at $f/f_0 = 0.359, 0.834, 1.199$ and 2.784. The check frequencies are then

Channel A		Channel B	
ϕ	f/f_0	ϕ	f/f_0
90°	7.492	90°	1.9304
180°	1.97	180°	0.5076
270°	0.518	270°	0.1335

U. S. N. R.

(Continued from page 47)

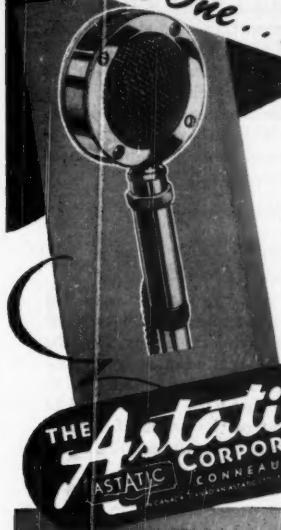
The Sixth Naval District Reserve Master Control Station conducted a surprise emergency and change-of-frequency drill on 21 September 1949. All stations were directed to shift transmitters and receivers to a designated frequency, and to use emergency power facilities. It was a realistic drill and pointed up certain weaknesses at some stations. However, the following complied in all respects: U. S. Naval Reserve Training Centers at Raleigh, N. C. (K4NAW); Jacksonville, Fla. (K4NR); Orlando, Fla. (K4NRO); Sheffield, Ala. (K4NAT); Gulfport, Miss.; Greensboro, N. C. (K4NRJ); Tampa, Fla. (K4NRC); and Electronic Warfare Company 6-13 at Daytona Beach, Fla.

Naval Reservists associated with Electronic Warfare units in the Hawaiian Islands were afforded an opportunity for realistic training coincident with MIKI, a large-scale Army-Navy amphibious exercise conducted in the fall of 1949. For the MIKI "invasion" an "Early Warning Net" comprised of Civilian Defense, National Guard and Naval Reserve units on all of the major islands was called into action and assigned the mission of providing early warning of the presence of "enemy" aircraft or vessels. The Coast Watchers, civilians of every race, creed and position, were stationed at strategic locations, and assigned the task of spotting and reporting to their respective reporting centers the number of ships or aircraft sighted, together with all pertinent details. Relay from observation posts was generally by telephone, walkie-talkie, or via local

(Continued on page 120)

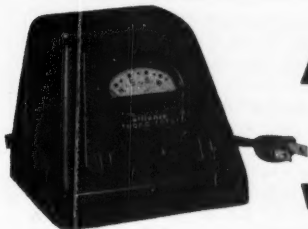
*Even if you don't
Own One...*

You Still Get More Enjoyment from ASTATIC D-104's than Any Other Microphone



If all your brother Hams quit operating, you would get no more pleasure from your own equipment. The point is that it takes their equipment, too, to put the enjoyment in your operation. And that's why you're bound to get more enjoyment from Astatic D-104 mikes than any other—simply because there are so many more in use. How does this mike get around so much? Well, you know the answer to that—it's the American Ham's first-love, and that ardor hasn't cooled a bit. Why not check into the superior performance characteristics that have kept the D-104 out front all these years?

Astatic Crystal Devices manufactured under Brush Development Co. patents



ALLIANCE TENNA-ROTOR for the HAM with DIRECTION INDICATION!

FOR 6 and 2 METERS-TV

NEW ALLIANCE TENNA-ROTOR MODEL DIR supports and rotates your multi-element beam on stainless steel bearing inserts. Built for rugged service and remarkably low cost. One year guarantee against defective workmanship and materials. Works on entire range of voltage, 105 to 125 volts! Compensating adjustment feature provided. Antennas heavier than 20 pounds require thrust bracket below.

FOR 10 METERS

TENNA-ROTOR THRUST BEARING BRACKET MODEL TBB adapts the Tenna-rotor above for most manufactured 3 element 10 meter beams. Entire direct vertical weights of from 20 to 300 pounds is carried on a ball bearing race. Removes entire weight from rotator and transfers it to the ground.



ALLIANCE MANUFACTURING COMPANY • ALLIANCE, OHIO

Export Department: 401 Broadway, New York, N. Y., U. S. A.

NEW!**NEW!**

Volume Four

Just Released

Hints & Kinks

Hundreds of money-saving ideas
PLUS NEW

Surplus Conversion Section

\$1.00 Postpaid

U.S.A. and Possessions, and Canada
Elsewhere \$1.25

American Radio Relay League
West Hartford, Connecticut

PEPS UP SENDING INSTANTLY

VIBROPLEX
Super DeLuxe
RADIO KEY

NEW
FEATURES

24-K
Gold-
Plated
Base Top
\$27.50

"PRESENTATION"

Has everything to make sending easy for you. Super-Speed Control Main Spring lets you send slower or faster than has ever before been possible; Jewel movement for easier manipulation; touch control to suit your hand; smooth, positive action; firm stance on table, and many others. Other models \$9.95 up. Left hand models \$1.00 more. At dealers, or

THE VIBROPLEX CO., Inc., 833 Broadway, N. Y. 3, N. Y.

LEARN CODE!

SPEED UP Your RECEIVING
with

G-C Automatic Sender
Type S

\$24.00 Postpaid in U. S. A.

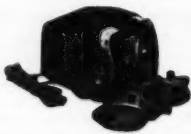
Housed in Aluminum Case. Black Instrument Finished. Small—Compact—Quiet induction type motor. 110 Volts—60 Cycle A.C.

Adjustable speed control, maintains constant speed at any setting. Complete with ten rolls of double perforated tape. A wide variety of other practice tapes available at 50c per roll.

GARDINER & COMPANY

STRATFORD

NEW JERSEY



police radio. Once the information was at the reporting centers where communication facilities were available, it was a matter of only minutes before the defense forces were evaluating the information and planning counterattacks. The Naval Reserve Electronic Warfare Facility at Hilo was the main reporting center for the island of Hawaii. The Electronic Warfare Facility at Kahului served as reporting center on Maui, while on the island of Lanai the Electronic Warfare Facility at Lanai City carried on. With the employment of c.w., radioteletype and voice radio, Electronic Warfare personnel who participated in Exercise MIKI agree that the training received was the equivalent of many months of scheduled drill instruction.

Hints & Kinks

(Continued from page 46)

brought to zero beat with the variable oscillator at, say, 3101 kc. The tuning rate will be the same as it is on the fundamental frequency, but the percentage accuracy is limited mostly by the stability of the crystal. A vernier adjustment to set the crystal to zero beat with WWV would be handy. No impairment of the normal functions of the meter was noticed after the amplifier was installed. — *Henry H. Cross, W100P*

Beginner's Question

(Continued from page 61)

is in a better position to work DX than his neighbor with a kilowatt 'phone.⁵ This is no small factor in keeping amateur radio the most democratic of hobbies.

Me? — I heat up the 'phone bands with a pair of GL813s as I mentioned before but I must confess that I batted a bug on c.w., and liked it, for a whole year after I had my Class A ticket, and I still listen in often to the c.w. rag-chews on 40 and 80. As an old-timer,⁶ my advice to you young squirts trying to decide between c.w. and 'phone is to try them both, pick which you like best for most of your ham activities, but don't be one-sided about it.⁷ You'll miss a lot of fun if you do.

⁵ Assuming equally efficient antenna systems for both.

⁶ Figure of speech, OM. Got my ticket in 1944.

⁷ According to the ARRL Handbook, the amateur is supposed to be well-rounded. This does not mean obese.

Correspondence

(Continued from page 61)

were hams, with I1KN and his wife and I1IT and his wife present, and Lucky translating what the priest said, and Cobi and I answering "Si." We received a very nice demonstration from them of the spirit that underlies amateur radio.

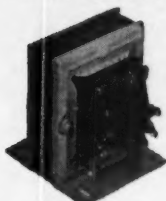
Just as we will not forget the memories of our visits to Florence, Rome and Venice, neither will I be able to forget the meaning of such friendships made by personal visits to amateurs in various countries.

— *Bob Leo, W6PBV/MP4BAL*

(Continued on page 122)

Outstanding POWER CONVERSION UNITS

for any Voltage and Amperage Rating



THERMADOR
TRANSFORMER



VICKERS
SELENIUM
RECTIFIER

R.P.S. Power Conversion Units specially designed to convert any d-c Receiver, Transmitter, etc., into a-c use. No rewiring necessary; simple, easy, quick installation. No Tubes! Instant Warm-up! Cool Operation! No Maintenance! Low Cost!

Installation Diagram with each unit. When ordering—be sure the input rating of your dynamotor does not exceed the d-c output rating of the rectifier. For

example, 12 V. 2 amp. dynamotors require Rectifier No. S-295A and Transformer RPS-8883.

Weights listed—contact freight agent for cheapest means of shipment and include charge with remittance.

All prices are F.O.B. Los Angeles (California purchasers add 3% sales tax). Include 25% with orders—balance on delivery. Foreign orders cash. Address correspondence Dept. C7.

ALL NEW—FULL WAVE VICKERS SELENIUM RECTIFIERS

Code No.	d-c Output	Ship.	Amateurs
Rectifier	Volts Amps.	Wt. Lbs.	Net Pr.
S-295A	14 2	1.25	\$ 6.95
S-458A	14 4.5	1.75	7.25
S-167A	14 10	3.75	10.95
S-292A	14 40	12	29.95
S-296A	28 1.8	1.25	5.75
S-344A	28 5	5.75	11.50
S-172A	28 10	6	16.50
S-291A	28 20	12	29.95
S-297A	28 40	23	52.25

ALL NEW—THERMADOR TRANSFORMERS 50/60 Cyc—117 Volt Primary Rating (For Taps, see Note A)

Code No.	Secondary	Ship.	Amateurs
Transformer	Volts Amps.	Wt. Lbs.	Net Pr.
RPS-8883	18 3	3.5	\$ 3.75
RPS-8884	18 5.2	5.5	4.25
RPS-8885	18 12	12	6.15
RPS-8886	18 46	35	19.65
RPS-8888	36 2	5	4.15
RPS-8889	36 6	12	6.75
RPS-8892	36 12	25	11.65
RPS-8890	36 23	32	19.25
RPS-8891	36 46	78	51.25

NOTE A: All transformers have 3 extra taps—For example: 20, 19, 18, 17 volts and 38, 37, 36, 35 volts.

Distributed Nationally by

RADIO PRODUCTS SALES, INC.

1501 SOUTH HILL STREET • LOS ANGELES 15, CALIFORNIA • PHONE PROSPECT 7471



COMPLETE RADIO TRAINING!

Prepare now to accept a responsible position in Commercial Radio. New developments will demand technicians with thorough basic training, plus a knowledge of new techniques discovered during the war. Training open to high school graduates, or those with high school equivalency. Courses 6 to 18 months duration in RADIO AND ELECTRONICS. Approved Veteran training in Radio. Write for Particulars.

VALPARAISO TECHNICAL INSTITUTE
DEPT. TN Valparaiso, Ind.



RADIO COURSES

- RADIO OPERATING
- RADIO SERVICING

- CODE
- FM TELEVISION

REFRIGERATION SERVICING

Personal Counseling Services for Veterans
Write for Catalog T.O. and Picture Brochure

TRADE & TECH. SCHOOL

INDICENT 2-81

BROOK All Triode High Quality AUDIO-AMPLIFIER

Combines
all these
features

Brilliant, clear tone.

Reduction of listening
fatigue.

Extremely low
volume without
any loss of
quality.

Distortion and intermodulation
at a new low.

Separate controls-stepped-for
Bass and Treble.



Write TODAY for
FREE Technical
Bulletin and Detailed
Distortion Analysis

for the
maximum
in listening
Pleasure

(illus. Model 10C3-30 watts)
Also available: Model 12A3-10 watts.

BROOK ELECTRONICS, Inc.

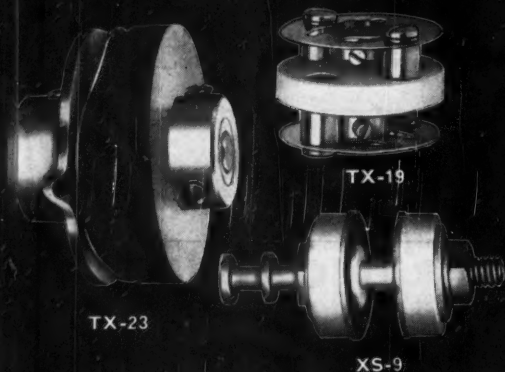
Sales Agent
Dept. QA-0,

34 DeHart Place,
Elizabeth N. J.



NATIONAL

- **Proven**
- **Dependable**
- **Quality**



TX-19 A steatite-insulated, flexible coupling for $\frac{1}{4}$ " shafts, conservatively rated at 5000 volts peak. Dia. $1\frac{1}{8}$ ", length 1". Length and flashover voltage can be increased by turning collars outboard. **\$1.25 net.**

TX-23 A deluxe, insulated, flexible coupling designed for coupling $\frac{1}{4}$ " shafts. Will handle a maximum radial mis-alignment of $1/16$ ", also a two-degree angular mis-alignment. **\$1.35 net.**

TX-24 Same as TX-23 but shaft size $5/32$ ". **\$1.35 net.**

TX-25 Same as TX-23 but non-insulated. **\$1.35 net.**

XS-9 Feed-through insulator. Hole size $13/64$ ". Insulators are adjustable for different partition thicknesses on silver-plated terminal stud. Ceramic insulators are of high-grade material designed for high-frequency equipment. **\$.30 net.**



HAM SPIRIT

1637 S. Kilbourn Ave., Chicago 23, Ill.

Editor, QST:

On a vacation trip through the West recently I utilized my 10-meter mobile rig occasionally to call "CQ Chicago" to get messages to the folks back home.

It was gratifying to hear amateurs as far away as Milwaukee and northern Indiana come back and offer to relay messages and even to make 'phone calls if necessary.

To the many readers who have written in deploring the disappearance of "the old ham spirit," I can testify that if you take the trouble to look you will see it alive and kicking.

— Ralph Eisenschim, W9HVG

Redley House, Mansfield, Ringwood, Hants., England
Editor, QST:

This is a short note to let you know what a wonderful reception all your hams whom I visited gave me.

I have just spent over two months in the States. My wife, daughter Zoe, and little grandson Tommy, took a 2500-mile trip to Miami, returning through Tampa and Birmingham, which gave me an excellent opportunity of calling on various hams. My XYL knew what it meant when I pulled up at a house with a rotary beam, or an antenna with what she termed a "ladder" (600-ohm feeder).

Without exception they all treated me in a wonderful way which I never even dreamed of — what a fine brotherhood! I only hope I shall be able to return such hospitality.

— C. Keith-Murray, G6DY

THOSE USED HANDBOOKS

83 Koster Row, Eggertsville, N. Y.

Editor, QST:

I have been wondering if the American ham shouldn't start giving a bit of thought and perhaps assume some responsibility toward those fellows with foreign prefixes, who are not quite so fortunate. I think you will agree that the average W or K is ridin' pretty high so far as amateur radio is concerned. In contrast, there are some foreign fellows who are struggling along with a minimum of equipment to say nothing of the lack of handbooks and callbooks. It is the latter accessories with which this letter is concerned.

As you know, handbooks and callbooks are purchased by the thousands each year. What becomes of the old ones? Are they thrown out or burned in the furnace? Don't you think they might be put to better use in far-off places, where it is impossible to buy them, or to transfer funds out of the country because of various governmental restrictions? Don't you think the American ham can be a factor here in spreading a bit of good will, as well as doing some fellow a fine deed?

— William B. Derrick, W2UNT

CO-OPERATION

1546 Fuller Ave., N.E., Grand Rapids 5, Mich.

Editor, QST:

Let's have a better coöperative spirit. Let's at least wait until the other fellow is done before calling that DX. Keep the final off until you are ready to call the station. Don't tune all over the band with a VFO and final going at once. Give the little fellow a break. If the DX is calling some particular area, don't be slighted if he doesn't include you. Don't bust in if he doesn't want a W6 or a W8. More listening and less calling will result in many more QSOs for everyone. Let's not learn our lesson the hard way.

— Louis Gerbert, W8NOH



RADIO and TELEVISION

Thorough Training in All
Technical Phases

APPROVED FOR VETERANS

WEEKLY RATES DAYS—EVENINGS

RCA GRADUATES ARE IN DEMAND

For Free Catalog write Dept. ST-50

RCA INSTITUTES, INC.

A Service of Radio Corporation of America
350 WEST 4th ST., NEW YORK 14, N. Y.



Start the
NEW YEAR
right

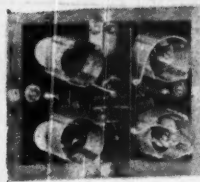


HARRISON

IS ELIMINATION
HEADQUARTERS!



"HARMONIKER"



Here's the latest, and most sensational TVI filter - as described in GE Ham News and December QST, page 36. Unlike 40 MC low pass filters, this half-wave filter attenuates ALL harmonics (as much as 110 DB for the TV band harmonics of an 60 meter xmitter!) Negligible insertion loss. For flat, untuned line with low SWR. Simple to construct! Nothing to tune or adjust when using our factory guaranteed 2% accurate condensers!

Harrison Kits contain the metal box, brass for inter-section shield, B and W Miniinductors, (no coils to wind!), ground posts, the indicated condensers, connectors, and complete instructions.

For 50 to 100-ohm coaxial cable (Includes coaxial fittings): With 1000 Volt (2000V Test) SILVER MICA condensers for stabilized tuned circuits. Will handle 1 KW CW or 250 W AM Fone RF output.

80 Meters - FI-95 \$5.99 40 Meters - FI-45 \$4.99
20 Meters - FI-25 \$4.29 10 Meters - FI-15 \$3.79

Same with 2500 Volt (5KV Test), 2% Transmitting Mica Condensers to handle a full KW Fone! 40 Meters - FI-46 \$9.41
80 Meters - FI-86 \$9.95 10 Meters - FI-16 \$6.85
20 Meters - FI-26 \$7.21

For 300 to 600-ohm twin lead or spaced open wire. (Includes feed-thru insulators): With 1000 Volt (2000 V Test) SILVER MICA condensers. Will handle 1 KW CW or 250 Watts AM Fone.

80 Meters - FI-83 \$6.71 20 Meters - FI-23 \$5.87
40 Meters - FI-43 \$5.47 10 Meters - FI-13 \$5.35

Same with 2500 Volt (5KV Test), 2% Transmitting Mica Condensers to handle a full KW Fone 40 Meters - FI-44 \$7.95
80 Meters - FI-84 \$7.95 10 Meters - FI-14 \$7.27
20 Meters - FI-24 \$7.27

Special copper plated utility box provided with all kits except kilowatt open wire/twin lead models.

ANY HARMONIKER WIRED AND TESTED - \$3.00 EXTRA (Add W to Item Number)

Special! Special! Special!

Copper plated utility boxes 3"x4"x5" Just the thing for those special UHF jobs. Excellent ground. Ideal for filters. Special at Harrison!

"SELECT-O-JECT"

Beat the QRM on the ham bands by using this unbelievably versatile, variable single-frequency rejection filter and selective amplifier! The "Select-O-Ject" plus a moderately priced ham receiver will give "big" receiver performance. Use with a quality receiver, gives the ultimate in selectivity! See National's big ad on inside back cover of Dec. QST, describing their improved version, read the article in Nov. QST, and rush your order to Harrison today!

National "Select-O-Ject" \$24.95
Complete with tubes

HARRISON SCOOP

RCA WV-65A BATTERY VOLTOHMYST

A completely self-contained, portable type, vacuum tube voltmeter-ohmmeter-ammeter. No external power required. Single instrument serves for bench and all "field" jobs.

Large Five-inch Meter
DC Volts: 0-3, 0-10, 0-30, 0-300, and 0-1000 Volts. Input resistance 11 Mega.
AC Volts: 0-10, 0-30, 0-100, 0-300, and 0-1000 Volts.
Ohmmeter: 0-1000, 0-10,000, 0-100,000 Ohms and 0-1, 0-10, and 0-1,000 Megohms.
DC Amper: 0-3, 0-10, 0-30, 0-100, and 0-300 MA, plus 0-10 Amperes.



VTVM circuit affords sensitivity not obtainable with ordinary V-O-M's. Meter protected against burnout - polarity reversing switch. Long battery life - lasts over a year in normal service. Attractive case 9 1/2" x 5 1/2" x 3 1/2". deep. Weighs 9 lbs. (including batteries)

Originally priced at \$87.50 net

HARRISON HAS IT NOW FOR ONLY \$39.50 Complete, less Batteries

Complete set of long-life batteries \$2.94

QUANTITY LIMITED! RUSH YOUR ORDER TODAY!

SIX SECTION M-DERIVED LOW-PASS FILTER KIT

Only
\$5.00

Item FI-6

You can easily build this terrific six-section, low pass filter as developed and described by Mack Seybold in his Dec. '49 QST article. Handles KW rig! Kit contains everything for complete filter (FIG. 13), including details of inductances.

Drake TV RECEIVER FILTER

Super-effective multiple section high-pass filter attenuates all low frequencies more than 60 DB down at TV IF frequencies. Any layman can install in 30 seconds! Absolutely no insertion loss of TV signals. Be sure to specify type of receiver lead-in.

For 300-ohm Ribbon TV-300-SHP Choice \$3.57
For Coaxial Cable TV-72-50HP

LOW PASS TRANSMITTER FILTER

Drake low-pass transmitter filters are now available for twin lead as well as coax lines. Use on any band, 10 to 160 meters - up to 1 KW input power.

For Coaxial Cable - TV-52-40LP Choice \$12.95
For 300-Ohm Line - TV-300LP

NEW HIGH VOLTAGE "HYPASSES" FOR EFFICIENT TVI REDUCTION

Developed by Sprague with cooperation of QST Tech. Staff (See story, Pg. 48, Oct. QST)

CAP.	VOLTS	NET
.005	600	\$1.29
*.1	800	1.41
.005	600	1.56
.01	1000	1.44
.005	2500	1.56
.01	2500	1.74
.002	5000	1.86
		1.92

*FB AC power line filter



WHIP ANTENNA BUY!!

Army whip antenna. Five sections screw together easily for up to 15', 10" length. High tensile strength steel tubes, copper plated, enameled. Heavy ferrules.

Brand new 5-section whip. Item AN-16 Special \$2.49

Same but bottom section machined to fit MASTER MOBILE mounts or any 1/2" - 24 threaded receiver. AN-16T \$3.24

Master Mobile insulated bumper support mount with dual taper spring. Complete with all hardware. \$5.95

Set of insulators and clamps for home station window or roof mounting. Instructions included. IN-1K 58c

HARRISON HAM-A-LOG

Just off the press! - The Holiday Edition of the HARRISON HAM-A-LOG featuring new anti-TVI items, terrific bargains in HES and standard parts and equipment, etc. etc. If you don't have it, send for your copy without delay!

73 to you all -
for a Merry Christmas
and a Happy New Year

Rt. W2AVA Bm, W2GUP Ed, W2TXQ
Rt. W2SEJ Qlx, W2EA Bm, W2GRK
Mie, W2BQF Qlx, W2WLV Jch, W2BNH
Ray, W2BJ Jct, W2ZCS

And the rest of the gang at

HARRISON
NEW YORK 7, N.Y.
225 GREENWICH STREET
(10 West Broadway, at Barclay St.)
Barclay 7-7777

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 30¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 30¢ rate. Provisions of paragraphs (1), (2) and (3), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested signature and address be printed plainly.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

Having made no investigation of the advertisers in the classified columns, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

Please note the 7¢ rate on hamads is available to ARRL members only.

QUARTZ—Direct Importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

DSL-100, \$12.25 up. Stamp for samples. Griffith, WJFSW, 1042 Pine Heights Ave., Baltimore 29, Md.

AMATEUR radio licenses. Complete theory preparation for passing amateur radio examinations. Home study and resident courses. American Radio Institute, 101 West 63rd Street, New York City.

DSL-1's, SWL's. Finest stock. Fairest prices. Faster service. Dossett, W9BHV QSL Factory, 857 Burlington, Frankfort, Ind.

DSL-1's! Kromkote cards at a fair price. Dauphinee, W1KMP, Box 219, Cambridge 39, Mass.

SUBSCRIPTIONS, Radio publications a specialty. Earl Mead, Huntley, Montana, W7LCM.

DON's QSL's, "The finest". Samples. 2106 South Sixteenth Avenue, Maywood, Illinois.

CRYSTALS: Precision low drift units. Type 100A in 80, 40, and 20 meter bands. Two units plug in one octal socket. Plus or minus 5 Kc. One dollar each. Exact frequency. \$1.95 ea. Rex Bassett, Inc., Ft. Lauderdale, Fla.

QSLs, SWLs. Those who want the best in QSLs. C. Fritz, 1213 Briargate, Joliet, Ill.

QSLs: Original designs priced to fit hams' pocketbooks. Stamps for samples. Leonard's Print Shop, 854 View, Hagerstown, Md.

QSL-SWL cards, personalized with photograph. The very best samples for addressed, stamped envelope. Bob Payne, W0JC, Marshall, Missouri.

QSL's, high quality, fair prices. Samples? WGPP R. D. Dawson, 1308 F Street, The Dalles, Oregon.

QSL's, Stationery, all kinds printing for the Ham. Samples free. WAHUD, Albion 306 322, High Point, N. C.

QSL, SWL cards. Jaggi, W5FAY, 6118 Goliad, Dallas, Texas.

WANTED: QST for February, March, July, 1916. Have January, September, October 1916; July 1917 and 200 other copies to sell or trade. W0MCCX, 1022 N. Rock Hill Rd., Rock Hill 19, Mo.

FOR sale: Eclair Twin Track recorder, practically new, with half-hour of tape with code recorded from 5 w.p.m. to 15 w.p.m. \$95.00. Faust H. Boyd, Ashton, Ill.

DISTINCTIVE SWLS-QSLs. McEachron, 1408 Brentwood, Austin, Texas.

BARGAINS: New and used transmitters-receivers-parts: Globe King, \$299.00; new 150-watt phone \$199.00; 60-watt phone, \$99.00; Globe Trotter, \$57.50; HT-17, \$39.50; New Meisner Signal Calibrator, \$29.95; TR-4, \$19.95; MB-611, \$39.00; Pierson KP-81, \$219.00; HRO 3TA1, \$199.00; SX-43, NC173, HQ-129X, \$139.00; RME-45, SX-25, \$99.00; Howard 430, \$29.50; S-38, \$29.95; S-41, \$22.50; latest signal shifter, \$59.00; DB22A, \$49.00; BC-610's, AF100, and many others. Large stock trade-ins. Free trial. Terms financed by Leo, W0GFC. Write for catalog and best deal to World Radio Labs, 740-42-44 West B'way, Council Bluffs, Iowa.

NEW crystals for all commercial services at economical prices, also regrounding. Over fourteen years of satisfaction and fast service. Eldon Electronic Company, 1802 North Third St., P.O. Box 31, Temple, Texas. Phone 3901.

SELL: Complete \$22. HRO W. RCA 155C 'scope, dual speed playback. Box 104, Brooklyn 28, N. Y.

SELL: HT-9, perfect condition, \$200. W0MZW, Kingston, Illinois. BC610: Sell final power supply deck, less plate transformer; exciter deck; drilled modulator deck chassis; lower cabinet skirts; lower control panel complete, with wiring; upper panels; exciter tuning boxes; meters. Want back covers: 250TH socket mounting brackets; handles, hardware, etc. W. Strasser, W8BLR, 15384 Birwood, Detroit 21, Michigan.

FOR sale: BC221 frequency meter AC power supply. SX25 special cabinet with speaker and 100 Kc xtal calibrator. Three power supplies on one chassis, 1500 volts, 400 miles; 800 volts, 175 miles; 250 volts, 150 miles. Also five inch 'scope V7VM Rf signal generator. Beauchemin, W2CTB, 118 Lexington Ave., Passaic, N. J.

WANTED: Good communications receiver SX-42. Good medium or high power transmitters. Don Clark, 19 N. W. Main, Blackfoot, Idaho.

REK-O-KUT (RK-D16) dual speed 16" recording turntable, motor assembly and mounting base with overhead feed mechanism and Webster R34 magnetic cutter, Astatic B-16 playback pickup. Good condition, \$160.00. F.o.b. New York City. A. Vandervoort, W2DGG, 54 Morningside Drive, New York City 25.

F. M. Tuner. G-E DeLuxe model 4XFM-1. Perfect. \$32.00. W21WS, 161 Darlington Road, Syracuse, N. Y.

QSLs SWLs? "America's Finest!" No cheap trash! Samples, 3¢. QSL-printer. Sakkers, W8DEB, Holland, Michigan. Made-to-order QSLs.

COLLINS 30K-1 with VFO exciter for sale, perfect condition. Original equipment, no changes. Best offer over \$995.00 takes it. F.o.b. Chicago. May be shipped by truck. Fred D. Patti, W9JIE, 8811 Lowe Ave., Chicago 20, Illinois.

SWAP Kodak Retina II, f2 with case or Argus C-3 with case and flash. A-1 condition for radio gear. Prefer Silver 801, 801B, 802, 803, 701; Brush Soundmirror or Meisner portable radio-recorder. Also have German 120 film f4.5 stereo camera, lenses good, shutters need repair. Reply via airmail. All F.o.b. Johnny Wine, Sr. BOQ Hq. FEAMCOM, APO 323, c/o Postmaster, San Francisco.

1-KW fone-xmitter, \$250.00, portable 35 watt FM 10-meter xmitter, \$40.00. Portable 10-meter receiver, \$15.00. Two BC-375E, 12 tuning units cheap. W4WSC, Box 516, Stryker, Ohio.

FOR Sale: Millen R-9er, used three months, in excellent condition. Complete with 10-meter coil and tube. \$18.00. Richard W. Werner, W8SOY, Grand Rapids, Minnesota.

FOR Sale: A supply of first-class equipment, such as HF converters and transmitters, power supplies, modulators, test equipment, adjust-a-volts, Vibrapaks, HF beams, coils, condensers, xtals. All at 50% off regular price. Send card listing your requirements. Orval Hanson, W9HBA, Box 383, Watertown, South Dakota.

ONLY two left! Top quality AN/ART-13's, complete with tubes, dynamometer, dynamic mike and manual. \$195.00. Fargo Electronic Engineering, 385 7th Ave., So., Fargo, North Dakota.

S-20-R receiver, 350 Kc, 44 Mc. In good working condition; Velvet vernier dial, schematic. In use now. \$0.00. A. T. Roberts, W5PJM, Route 5, Box 653, Shreveport, Louisiana.

MAKE an offer! 500 watt AM fone xmitter. 810's final. D-104 mike, BC696, 30 feet windmill tower, 4-element beam. W9UTL, 1768 Fruitdale Avenue, Indianapolis, Indiana.

FOR Sale: Collins Kilowatt on 14.265 Kc. Price: \$1500. Also: Collins 30K, price: \$850.00 F.o.b. Both guaranteed perfect. W1CPI.

MOTOROLA police radio installation. Transmitter, receivers, speech amplifier, frequency meter, accessories. Easily converted for ham use. Originally priced at \$200.00. Price: \$100.00. Write for complete details. W. B. Hert, City Hall, Sedalia, Missouri.

CUSTOM Rebuilt HRO, 6AK5 first R.F., directly calibrated slide rule dial, noise silencer, regulated—compensated oscillator, rack or table mounting, dust cover, power supply, eight coils continuous coverage 100 Kc. to 30 Mc. AN connector for Q'er, perfect condition and in alignment. \$150.00. W3NJE, P.O. Box #11, Ivyland, Penna.

SELL: Instructograph, AC, ten tapes, instruction book; in excellent condition. Arthur Meinhardt, W2CMD, 1170 Brighton Beach Avenue, Brooklyn 29, New York.

FOR Sale: Complete ham station, Lafayette B-5 xmitter in floor rack with coils for 10, 20, 40 meters; Sky Champion receiver, antenna; Astatic mike, S-meter, many extras,—all for \$300.00. To first bidder. Will ship via express anywhere. Reason for sale: VL trouble. W7IRN, Arthur H. Salebury, St. Lewis Avenue, Billings, Montana.

QSLs: "Doc's are fine, Jim's are clever, but Larry's are the 'best'—either." Samples on request. Larry's QSL Shop, Opportunity, Washington.

SELLING out: Transmitter, 500W CW fone, using PP 812As with 811 modulators. Enclosed in all metal rack cabinet. BC-45V VFO and Turner microphone. Forty through ten meters, complete set of coils. \$300.00 or best offer. R. P. Rushing, Box 426, Carlisle, Penna. Telephone SR31.

QSLs G. L. Taylor, Sumrall, Mississippi.

600 Mill power supply 1800, 1500 or 1200 volts, \$50.00. Kilowatt Class B modulator, \$50.00. All new parts unmounted. W2BIC, Commodore Hotel, Atlantic City, N. J.

BC348, AC power supply, speaker, electrical bandspread, double conversion through SC274N, usable separately as broadcast receiver; ANL, all \$30.00; SC522, \$20.00; Two PE103As, \$13.00 each; 6v Vibrator, \$20.00; VDC 65 MA, fully filtered, \$10.00; AC-DC midjet multimeter, \$14.00; S40A, \$45.00; 10-meter converter, \$10.00; 10-meter transmitter (converted 322), AC power supply, ready to operate, \$40.00; BC455 converted for 6v, \$7.50; numerous hard-to-find parts. Write for list. K2XN, Rawson, 53 Richards Avenue, Dover, N. J.

FOR Sale: rack-mounted PA stage that will run about 350 watts. Tube complement, two 866RS, VR150, 523 and PP 135s, \$48.75. All inquiries answered. Elbert N. Wood, W4OZY, 300 N. Houghton St., Williamston, N. C.

BLILEY AX2 xtals, guaranteed perfect; one dollar each (reason: VFO) following frequencies: 7356; 3629.2; 3586.1; 3572.4; 3637.5 Kcs; Petersen "PR" 3676; 3651; 3636 Kcs; Valpey CM5 3691; 3669 Kcs; George M. Clark, jr., W2JBL, 222 Hicks Street, Apt. 4C, Brooklyn, N. Y.

ART-13 for sale or will trade for Harvey-Wells TBS-50. Gene Pfeiffer, 522 Hollins Ave., Helena, Montana.

SELL: New Hallcrafters S-72 portable. Want: S-39 portable, in best condition. Walter Camp, jr., 236 Emerson Street N. W., Washington 11, D. C.

FOR Sale: Unused ART-13, \$100.00; used Millen exciter with full set of coils, \$30.00. Little-used Millen VFO 90700, \$30.00. Write to W7IKV, 1370 11th Avenue, Helena, Montana.

10 and 20 meter beams, \$19.25 up. Aluminum tubing, etc. Willard Radcliff, Fostoria, Ohio.

QSLs: Quality is remembered long after price is forgotten! C. Fritz, 1213 Briargate, Joliet, Illinois.

NEW I-82A Selys Indicators, \$3.95; new BC-1206C, "Lary O. Fiver", \$5.95; new BC-453B, \$12.95; FL-8A filters, \$1.37. FL-SF filters, 924. Excellent used AN-APS-13, \$14.95. Guaranteed T-17 mikes, 694. Trouble-shooting Manuals (includes schematics) BC-348, BC-779, SCR-522, BC-610, \$1.00 each. Add postage. Free catalog. Electronic Research Laboratories, 1021-Q Callowhill St., Philadelphia 23, Penna.

CLOSING out demonstrator models and slightly used AC lighting plants, 500 watt, \$50.00; 1000 watt, \$150.00; 2000 watt, \$200.00; 2500 watt, \$260.00; 5 K.W., \$370.00; 15 K.W., \$850.00. Manufacturers of converters and motor generator sets. Katolight, Mankato, Minnesota.

SELL: Hallcrafters S-53, like-new in appearance and performance. Used only 3 weeks, \$55.00. Fred Ball, jr., 120 West Hutchison, San Marcos, Texas.

FOR Sale: Components for transmitters, receivers and power supplies. WSPUE, J. A. Bowers, 1371 Valley Pl. S.E. Washington 20 D.C.

SELL: Never used items: McCurdo Silver 703 Freq. multiplier, 3 through 60 megs.; HRO-W with 9-coil sets; 750 volt rack panel, 300 ml. power supply, with Kenyon transformers and chokes. Also, use Meissner Deluxe Signal Shifter, 80-40-20 coils, in excellent condition. Best offer all or part. F. H. Minturn, W4GVH, 317 Eighth Ave., S., Lewisburg, Tennessee.

SELL or trade: new BC-375, 4 tuning units, Stancor 30M mobile miller. Converted prop-pitch motor. Model 80 recorder. Want: automatic bug, BC459, oscilloscope or what have you? WBDXH, Grayling, Michigan.

SELECTIVE buying at northern New England's foremost amateur supply house insures top quality, up-to-date merchandise that represents the best value for your dollar. Evans Radio, Concord, N. H.

SALE: NC-173 with speaker and NBFM unit. Regular \$217.45 for only \$130.00. Used one month. John R. Crane, W8KOZ, Excelsior, Minn.

UNCLE Fred's QSLs. For Hama of distinction! Three colors and up. Rainbow map QSLs. Special DX QSLs. Samples, 10¢. Uncle Fred, Box 86, Lynn, Penna.

ZIMPO lighter, ARRI insignia and call sign, inlaid enamel, \$4.00. 10¢ birthday gift, McCarron, W2BNO, 3050 Decatur Street, New York 67, N. Y.

HAMMARLUND 4-20 and 4-11 modulator, coils for 10-20-40-80 meters, \$40.00, also Sky Buddy, \$15.00. Levern Glau, Route 1, Sioux City, Iowa.

GOING to low power on account of TVI. Sell or trade deluxe kilowatt phone. Cost over \$1,200. Make an offer. Write for description. WSDA, 4425 Bordeaux, Dallas, Texas.

"TAB" Guaranteed tested tube specials: 954, 146, 955, 166; WE-215A, VR92, CK1005, 9006, ea 18¢; 1R5, 1S5, 5Y3GT, 6AG5, 6BG6G, 6BH6, 6HG6T, 6J6, 6SN7GT, 7V4, 12AT7, 11Z23, each 37¢; 388A, 406, 1N34 xtals, 83¢; 6V Carver Magnatrons, 400V/150 Ma. \$8.98, 250V/100 Ma., \$4.98; Both \$12.49. Tuning meters, 5 Ma. 98¢. GE/211G Selys tested perfect used pair \$1.49. VHF Mobile Hamband antenna 30Cm/12" ATS/ARRI, 39¢ 4/31.00. Excellent Fidelity dynamic microphone plus matching hi-gain transformer, both \$1.49. Write for Bargain "Tabogram". "TAB", 109 Liberty St., NYC, NY.

MAGAZINES: Radio, Electronic, etc. sold and bought. Landis, 157c Leveitt, Boston 14, Mass.

BC348 with AC power pack, \$50.00; BC-610E, \$500.00; BC-919A antenna unit, new, \$17.50; SCR-522, complete, cables & MG, \$40.00; Wilcox panel mount, 63A1 dual channel antenna, \$12.00; Wilcox 90A2 oscillator, \$8.00; Wilcox M57D1 line amp, \$10.00; Millen 90800, 50 watt xmttr, \$25.00; Millen 90505 secondary at 10-25-100-1000 Kc to 50 Mc, 8000 cym, mod. 110 V, 60 cy. \$50.00. N. K. Stover, W3BBV, 1357 Hill St., York, Penna.

BC-348-R 110V, \$55.00. R. S. Greenwald, 4929 Escalon Ave., Los Angeles 43, Calif.

TRADE recording equipment and power tools for good transmitter. All inquiries answered. Allan Morrell, W2JKM, 78 Stephen Place, Valley Stream, N. Y.

ART-13 for sale, best offer. W9OAD, 1920 Willow Street, Denver, Colorado.

COMPLETE new PE-103, \$11; new BC-459, \$8.00. W9HRQ, 245 Quonot, Iowa 44, Iowa.

QSLs-SWLS. Meade, W8KXL, 1507 Central Ave., Kansas City, Kans.

WANTED: Collins 32V-1 or 2 transmitter. Curtis, KFRO, Longview, Texas.

NEARLY new NC-183, \$229.00; SX-42, \$195.00; S-53, \$59.00; NC-57 with meter, \$75.00; BC610-E, \$625.00; VHF-152, \$59.00; Hunter Cyclometer, \$139.00. Many reconditioned sets at lower prices. Van Sickle, 102 South Penn St., Indianapolis 4, Ind.

BARGAINS: New and reconditioned Collins, Hallcrafters, National, Hammarlund, RME, Millen, Meissner, Sonar, Televac, receivers, transmitters, etc. Reconditioned S-40A, \$59.00; SX-43, \$129.00; SX-42, \$179.00; NC-57, \$59.00; NC-173, \$139.00; NC-183, \$199.00; HQ-129X, \$129.00; SPC400X, \$249.00; RME45, \$99.00; RME84, DB22A, HF-10-20, VHF152A, HFS, HRO7, HRO5TA1, NC240, NC200, S-38, S-53, SX-25, SX-28A, S-47, BC-610, T350X, NVI, Collins 32V1, etc. Shipped on approval. Terms. List free. Henry Radio, Butler, Mo.

FOR Sale: HT-9 coils, 80-40-20-10, 1 spare 814, excellent condition. Used 14 months. First check over \$250.00 takes it. Reason for sale, no room or time to operate. John G. Seitzinger, W5OKL, Box 726, Pharr, Texas.

HELP European hams to get on the air. Old magazines, call-books. Handbooks all very welcome, also radio parts. You can please the XYL, and increase DX. Please mark with your name and call, and send box by parcel post to R. O. Deck, 1807 APO 207-1, c/o Postmaster, New York City.

MEISSNER 150B, complete with ECO, \$200.00. William S. Bosworth P.O. Box 383, Atlantic Ave., West Sayville, L.I., N.Y.

FOR Sale: Complete converted ART-13, complete SCR-522, ARC-3 VHF receiver, transmitter units, converted BC-348Q. Best offer. W9WIS, 5245 Lansdowne Ave., St. Louis 9, Mo.

SELL HRO-5TA1 complete and good condition. First \$200 check takes it, express prepaid. Lee G. Davy, W4FCU, 1532 Belmeade Drive, Kingsport, Tenn.

SWAP nearly new NC-183 (don't want to lose my shirt selling it out-right) for high grade test equipment, new Frigidaire Deepfreeze etc. W9MAC, 1237 Ninth St., Beloit, Wisconsin.

FOR Sale: Manger beam rotor, complete, \$30.00; U.H.F. Resonator 10-meter 4-element beam, \$30.00; filament transformer, four 6.3 volt windings, 22 amp, \$3.00. W4LQJ.

NEW NC-183 receiver, speaker, and NFM adapter, \$195.00. Sale reason: inactive amateur. Richard Gysan, 902 Hanna Building, Cleveland, Ohio.

TECHNICAL manuals on SCR-211 (BC-221) Freq. Meter, Original, unused, 162 pages detailed data, schematics, \$2.00 each, postpaid. Frank Dunan, W3NB, 1717 Lang Place, NE, Washington 2, D. C.

MUST sell quickly. Complete ham station built into professional console, including SX-32 receiver, 500-watt modulator, 300-watt transmitter, HV power supply, 1000-watt rack mounted scope, plus valuable parts and equipment. Invite all offers. Sam Korin, 129 Wadsworth Ave., New York 33, N. Y.

SELL 2200-4400 each side center tap 1000 VA transformers, guaranteed. F. G. Dawson, 5740 Woodrow Ave., Detroit, Michigan.

SELLING out whole works. Reason: college. Send for complete list. Dave Ott, W9HDK, Hinsdale, Illinois.

WANTED: 250 to 300 watt multi-match modulation transformer. Allan Moser, W9RPH, 1013 Randolph Street, Winnetka, Illinois.

FOR Sale: Nearly complete KW-CW kit including power supply, four 75TLA, condensers, rack, etc., plus many other parts. \$90.00 or best offer for the whole lot. W2TAM.

FOR Sale: Hammarlund 4-20 xmttr, with coils. In perfect condition. \$35.00. M. Hart, 87 Sherman Avenue, Jersey City 7, N. J.

SALESMEN: Part time to sell complete line radio parts and equipment, liberal commissions, in all cities of over 10,000 population in the states of Oklahoma, Arkansas, Missouri, Kansas, Colorado, New Mexico, Louisiana, Mississippi and Texas. Should have wide home town acquaintance. Write J. E. Woods, 103 Pamela Drive, Belairs, Texas.

QSL-SWLS! Snappy service. Cushing, WHJTI, Box 32A, Manchester, N. H.

SELL: Signal Corps BC-412B oscilloscope, made by Western Electric. In new condition. Make an offer. W7SDX, Dutton, 527 Cherry St., Boulder City, Nevada.

LABORATORY quality test equipment. Urgently needed for cash. Overbrook Company, Overbrook 81, Mass.

QSLs. Samples for a dime. Refunded on ordering. Narvestad, Granite Falls, Minnesota.

MAGNETIC recording wire for all wire recorders. Buy by the pound. Spool it yourself. Richardson, W2AOP, Box 96, West Brookfield, Mass.

SELL: SCR522 xmttr, rcvr and power supply, complete and converted \$40.00. Scott S1R-F communication receiver, \$50.00. R. H. Wickens, W2TPZ, P.O. Box 16, Eastport, L. I., N. Y.

SWLS, QSLs. 3¢ stamp. Harrison, 8001 Piney Branch Road, Silver Spring, Md.

FOR Sale: Hallcrafters HT-18 NBFM, VFO. Best price over \$75.00. R. H. Brown, W9BB, 521 Lincoln, Stillwater, Okla.

TECHNICAL Manual on Recv-Txns, RT46/TRC10 with PE-214B. Original, 150 pages, schematics, detailed instructions, \$1.75. W3NB, F. Dunan, 1717 Lang Place, N.E., Washington 2, D. C.

COLLINS 32V1 75A complete with Atatic microphone Workshop 10-meter beam. Will sell for best reasonable offer within 15 days. B. J. Kozak, Qtr N-2, MCS Quantico, Virginia.

FOR Sale: 150-watt, 15 ohm Ohmite rheostats, Sprague filterettes, condensers, ten two-station interface Amplicon units, miscellaneous terminal lugs, and many other miscellaneous surplus articles such as Lighting Plants, Converters, and generators. Katolight, Mankato, Minn.

10-METER Beams, \$19.50. Send Card for free information, Riverside Tool Co., Box 87, Riverside, Illinois.

TRAIN FOR ALL TYPES FCC (RADIO OPERATOR) LICENSES

Complete Raytheon AM and FM broadcast transmitters and studio control equipment. Also TV camera chain unit, 30th anniversary year. Send for catalog, \$4.

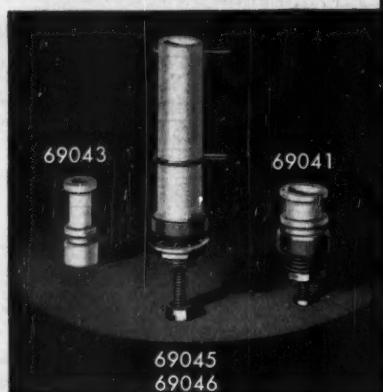
MASS. RADIO SCHOOL

271 Huntington Avenue Boston 15, Massachusetts
Lic. by Comm. Mass. Dept. Ed.

Designed for



Application



**The No. 69040 Series
of
PERMEABILITY TUNED
CERAMIC FORMS**

In addition to the popular shielded plug-in permeability tuned forms, 74000 series, the 69040 series of ceramic permeability tuned unshielded forms are available as standard stock items. Winding diameters and lengths of winding space are $1\frac{1}{2}$ x $\frac{1}{2}$; $\frac{1}{4}$ x $\frac{3}{8}$; and $\frac{1}{2}$ x $1\frac{1}{4}$, for the 69041, 69043 and 69045 respectively. Nos. 69043 and 69046 have powdered iron slugs while Nos. 69041 and 69045 have copper slugs.

**JAMES MILLEN
MFG. CO., INC.**

**MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS**



Index to Advertisers

Advance Electric & Relay Co.	112
Alliance Mfg. Company	119
Allied Radio Corporation	101
Almo Radio Company	108
American Radio Institute	110
American Radio Relay League	91, 94, 120
Ashe Radio Company, Walter	103
Astatic Corporation, The	119
Barker & Williamson, Inc.	127
Belden Manufacturing Co.	83
Bliley Electric Company	80
Brook Electronics	121
Burstein-Applebee Company	116
Candler System Company	98
Capitol Radio Engineering Inst.	95
Cleveland Inst. of Radio Elec.	128
Collins Radio Company	2
Commercial Radio Institute	118
Condenser Products Company	77
Drake Company, The R. L.	104
Eitel-McCullough, Inc.	75
Electric Eye Equipment Co.	98
Electro-Voice, Inc.	79
Gardiner & Company	120
General Electric Company	1
Greenlee Tool Company	114
Hallicrafters Company, The	4, 7
Harrison Radio Corporation	123
Harvey Radio Company, Inc.	87, 88, 89
Henry Radio Stores	99
Hy-Lite Antennae, Inc.	116
Instructograph Company	102
Jensen Manufacturing Co.	85
Johnson Company, E. F.	106, 117
Kato Engineering Company	100
Lambda Electronics Corp.	106
Leeds Radio Company	109
Mallory & Company, Inc., P. R.	73
Mass. Radio & Teleg. School	125
Millen Mfg. Co., The James	126
Milwaukee School of Engineering	113
Motorola, Incorporated	112
National Company, Inc.	69, 122, Cov. 111
New York YMCA Trade & Tech. Schools	121
Newark Electric Company	97
Ohmite Manufacturing Company	81
Petersen Radio Company	5
Pioneer Broach Company	86
Port Arthur College	104
Precision Apparatus Company	82
RCA Institutes, Inc.	122
Radio Corp. of America	Cov. IV
Radio Products Sales, Inc.	121
Radio Shack Corporation	92, 93
Signal Electric Mfg. Co.	110
Simpson Electric Co.	84
Srepro, Incorporated	108
Steinberg, Inc.	96
Sun Radio of Washington	107
Telex, Incorporated	100
Terminal Radio Corporation	105
Timing Devices Company	90
Triplett Electrical Inst. Co.	71
Turner Company, The	117
United Transformer Co.	Cov. II
Valparaiso Tech. Inst.	121
Van Sickle Radio Supply Co.	118
Vesto Company, The	118
Vibroplex Company, The	120
Wholesale Radio Parts Co.	115
Wind Turbine Company	114
World Radio Laboratories Inc.	111

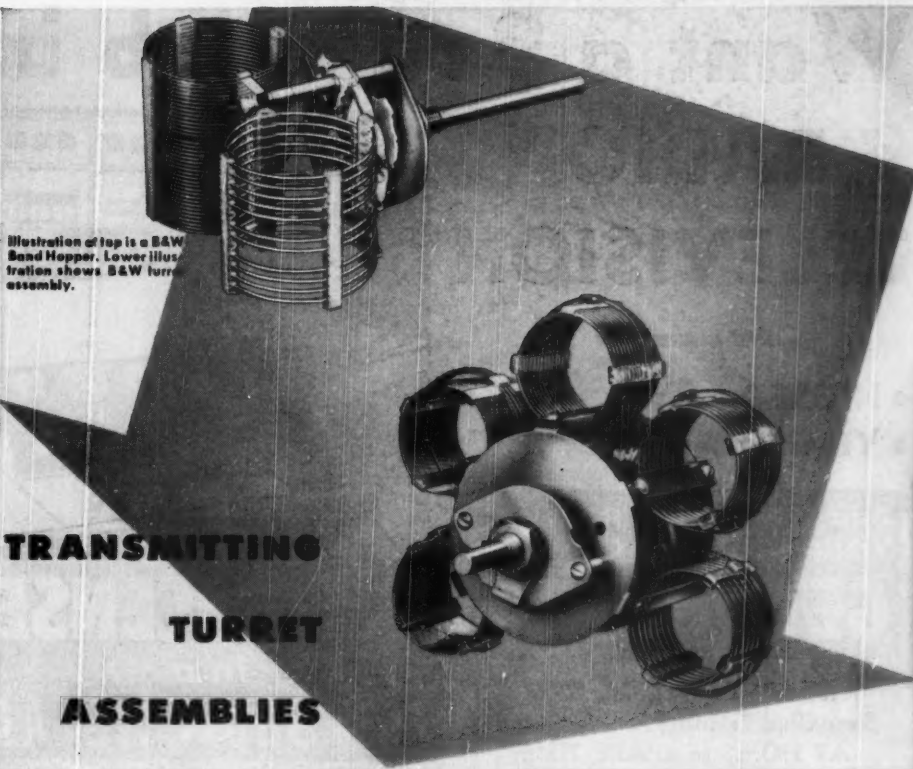


Illustration of top is a B&W Band Hopper. Lower illustration shows B&W turret assembly.

**TRANSMITTING
TURRET
ASSEMBLIES**

... a **B&W** first!

These handy B&W turret assemblies for transmitters were the pioneers of their type . . . for, Barker & Williamson were the first to design and build a simple, quick method for band switching, without the tedious job of changing coils.

These turret assemblies are sturdy, dependable and easy to use. Coils are the famous B&W air-wound inductors, another first in the electronic field.

Available from 80-10 meter bands and up to 150-watts.

Write for the B&W Catalog on Air-Wound Inductors and Variable Capacitors to Dept. Q-10.

BARKER & WILLIAMSON, INC.

237 FAIRFIELD AVENUE, UPPER DARBY, PA.

Want a Better Job in RADIO- TELEVISION

that assures you

- HIGHER PAY
- YEAR-ROUND SECURITY

Add TECHNICAL TRAINING to
YOUR HAM EXPERIENCE and

GET YOUR FCC

It's EASY If You Use CIRE
Simplified Training and Coaching
AT HOME in SPARE TIME

Get your license easily and quickly and be ready for the jobs now open to *commercial* ticket holders which lead to \$3000-\$7500 incomes (average pay reported by FCC nationwide survey). CIRE training is the only planned course of coaching and training that leads directly to an FCC *commercial* license.

GET THIS AMAZING BOOK FREE

Look what it tells you →

1. Tell of Thousands of Brand New Better Paying Radio Jobs Now Open to FCC License Holders.
2. Tells How We Guarantee to Train and Coach You Until You Get Your FCC License.
3. Tells How Our Amazing Job-FINDING Service Helps You Get the Better Paying Radio Job Our Training Prepares You to Hold.

**Your FCC Commercial Ticket Is Always
Recognized in All Radio Fields as Proof
of Your Technical Ability**

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk QT-13, 4900 Euclid Building, Cleveland 3, Ohio



COMMERCIAL
Radio Operator

LICENSE

in a
Few Short Weeks

Amazing CIRE Job-Finding Service Helps You Get a BETTER Job

Our Job-Finding Service will help you get the job our training and an FCC Commercial License entitles you to hold. Use this *proven* success combination — Ham Experience — Technical Training — FCC License — Job-Finding Service. It has worked for thousands . . . it will work for you.

Here's Proof That We Find Jobs!

"Thanks for the Application for Employment you recently prepared for me. I found satisfactory employment. I submitted 37 letters, enclosing the resume you supplied. I received 17 letters indicating my application was filed for future reference; 3 telephone calls, and one letter requesting personal interviews. As a result, I am employed in a development engineering capacity."
Student No. 4235 NB



Get All 3 FREE Send Coupon Now!

Cleveland Institute of Radio Electronics

Desk QT-13, 4900 Euclid Bldg.

Cleveland 3, Ohio

(ADDRESS TO DESK NO. TO AVOID DELAY)

I want to know how I can get my FCC *Commercial* ticket in a few short weeks by training at home in spare time. Send me your amazing new FREE Booklet, "Money Making FCC License Information" as well as a FREE sample FCC-type exam and FREE booklet, "How to Pass FCC License Examinations" (does not cover exams for amateur license).

Name.....

Address.....

City..... Zone..... State.....

☐ Veterans check for enrollment information under G.I. Bill

1

The superb NC-173
with the 6-position
crystal I.F. filter

2

plus the amazing
new SELECT-O-
JECT A.F. filter



NOW! finer performance
with **DUAL SELECTIVITY**

One of the most satisfying characteristics of the world-famous NC-173 — acclaimed the finest communication receiver in its class — is its versatile selectivity.

A six-position switch, with crystal filter, provides the broadest to the narrowest I.F. band widths. Now, an accessory socket has been provided for the amazing new SELECT-O-JECT described on this page in last month's issue. This remarkable device boosts or rejects any audio signal (80 cps to 9000 cps) 38db! Together, they provide DUAL SELECTIVITY — selectivity you've never known before!

**Slightly higher west of the Rockies*

SELECT-O-JECT

is available in two modes — the SOJ-1 for connection to any National receiver and other receivers capable of supplying 6.3 volts at 0.6 amperes and 200-250 volts at 4 ma; and the SOJ-2 wired to plug into the HRO-50, the NC-181 or the NC-173.

\$24.95*

NATIONAL COMPANY, Inc.
MALDEN, MASSACHUSETTS

BEAM POWER



PICK YOUR POWER FROM THIS CHART

Watts Input		Final Amplifier		R.F. Driver		Modulator Tube	
CW & FM*	Phone†	Beam Power	Tube Type	Beam Power	Tube Type	Push-Pull Stage	Service Class
17	15		5763		5763	6AQ5	AB ₁
34	30	PP 5763			5763	6F6	AB ₁
40	27		2E26		5763	2E26	AB ₁
80	54	PP 2E26			5763	807	AB ₁
75	60		807		807	811-A	AB ₁
150	120	PP 807			807	810	B
500	400		813		807		
1000	800	PP 813			807		

*Maximum ICAS Ratings for RF Amplifier—Class C Telephony
†Maximum ICAS Ratings for RF Amplifier—Class C Telephony

The Fountainhead of Modern Tube Development is RCA

In modern rigs power gain counts ...and RCA Beam Power tubes have it

THIS QUARTET of beam power tubes offers the modern approach to compact, efficient transmitter design. They require less drive and deliver more output at lower plate voltage, than any other similar tube types within a comparable price range. In addition... the absence of high-level intermediate stages in a beam power transmitter is a long step toward the elimination of TVI.

What's more... these RCA beam power tubes are excellent for quick-change, multi-band transmitters because they seldom require stabilization in well-designed circuits.

Newest of the family is the RCA-5763 miniature... capable of 17 watts input (ICAS-class C telephony) to 175 Mc. Its high power gain and extra emission make it a highly efficient frequency multiplier.

To get all the performance and life you pay for... buy genuine RCA tubes in the familiar red, black, and white cartons from your local RCA tube supplier.

Start the New Year right with the handy WAS Log appearing in the Nov.-Dec. issue of HAM TIPS. Your RCA tube supplier has a copy waiting for you.



RADIO CORPORATION of AMERICA

ELECTRON TUBES

HARRISON, N. J.